APPAREL RESEARCH NETWORK (ARN) PROGRAM

Final Technical Report

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Implementation of VITUS 3D Whole Body Scanning for Item Size Selection & Integration to ARN Systems for Issuing at Ft. Jackson

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14. ABSTRACT

This paper presents a summary of the results of the Apparel Research Network's (ARN) installation providing for the development and implementation of the Integrated Retail Module (IRM) at Ft. Jackson, Columbia, SC. The IRM solution ties together: (1) the Virtual Item Manager-Wholesale Local (VIM-WL) web based inventory management application; (2) both a wired and wireless network outside the Ft. Jackson Army firewall; (3) electronic forms filing and management with CabinetNG; (4) RF applications with handheld terminals for warehousing data capture; (5) Merlin application software system for Recruit Issue Forms Processing; and, (6) optical character recognition automated issue capture system known as the IRM Control Panel. IRM is part of the ARN solution to reduce military clothing inventories through automated systems for asset visibility at the wholesale, retail and manufacturing levels and balanced flow replenishment.

15. SUBJECT TERMS

Apparel Research Network (ARN); Integrated Retail Module (IRM), Recruit Clothing; Supply Chain Management; Virtual Item Manager/Wholesale Local; Quality Logistics Management System (QLM); Recruit Training Center; Inventory Management, and electronic forms management and filing systems (CabinetNG).

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Preface

This Final Technical Report (FTR) covers project work accomplished for the Apparel Research Network (ARN) of the Defense Logistics Agency (DLA) in conformance with the AdvanTech, Inc. Delivery Order 0006 and the Human Solutions of North America, Inc. Delivery Order 0003 during the period 1 September 2003 to 28 February 2005. This project is a redirection of Work Packages (WPs) and tasks from a project originally planned for implementation at the Great Lakes Naval Training Center (GLNTC) project to Ft. Jackson, South Carolina.

This project was completed as a joint research, implementation and evaluation effort of AdvanTech, Inc. and Human Solutions using 3D Whole Body Scanning technology in accordance with the redirected Work Packages (WPs). The project involved 2 principal tasks: 1) Integrate 3D Whole Body scanning technology with the ARN Integrated Retail Module (IRM) for clothing issue at the Central Initial Issue Point (CIIP), Recruit Training Center (RTC), Ft. Jackson, SC; and, 2) Refine the existing scanning processes at MCRD-San Diego & Parris Island, and install the production Cyberware WBX scanner at MCRD-SD and integrate it into ARN IRM.

Addition information on the Apparel Research Program is available from the ARN web site at http://arn2.com.

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1 EXECUTIVE SUMMARY

1.1 Overview

The Apparel Research Network-Integrated Retail Management (ARN-IRM) solution for the CIIP, Ft. Jackson was implemented prior to this project. It specifically covered the rollout and ongoing support of (1) the ARN Virtual Item Manager-Integrated Retail Module (VIM-IRM) web based inventory management application; (2) both a wired and wireless ARN Local Area Network outside the Ft. Jackson firewall; (3) electronic forms filing and management with CabinetNG; and (4) Radio Frequency (RF) applications with hand-held terminals (HHTs) for receiving and warehousing data capture.

This project report covers the implementation of the ARN Fully Automated Supply Chain Management solution concentrating on the integration of ARN-IRM with the 3D Whole Body Scanner technology at the U. S. Army CIIP, Ft. Jackson, for automation of uniform fitting and issue data capture.

This project was completed as part of the ARN program's on-going research initiatives. The project work included evaluation of the 3D Whole Body Scanning technology for automatic uniform size selection of selected garment items to increase efficiency during the uniform issuing process and to improve the information used to manufacture garments. Under ARN's previous and on-going research initiatives, 3D Whole Body scanning technologies were evaluated for automatic uniform size selection of selected garment items to increase efficiency during the uniform issuing process and to improve the information used to manufacture garments. Currently, related ARN research initiatives include the application of 3D Whole Body scanning capabilities for dress uniform issue at the Marine Corps Recruit Depots in San Diego and Parris Island.

The main goals of the ARN 3D scanning research initiatives at Ft Jackson were to build on previous and related research efforts at the US Marine Corps sites and to: 1) establish base-line information for future contracting and manufacture of uniforms; 2) identify the correct uniform sizes required to reduce stock levels and increase efficiency; and, 3) enhance operations and the effectiveness for the complete uniform supply chain and thus drastically reduce costs in the overall process. In addition, a portion of the emphasis for this project was continued research and evaluation of incorporating a whole body scanner for automatic body dimension extraction and uniform garment size prediction into other systems.

A concurrent research effort was to implement the base foundation capabilities for the ARN systems for integration of this project into the Apparel Research Network (ARN) Supply Chain Management (SCM) initiatives. This project report also tracks the research effort associated with evaluating and implementing the 3D Whole Body Scanner technologies for optimizing uniform measurement and fit prediction processes.

A primary focus of this project was to initiate and complete the pilot installation of the Human Solutions 3 Dimensional (3D) Whole Body scanning capabilities (VITUS/Smart hardware and ScanWorX software) for automatic issuing item size selection of U. S.

Army male recruit dress uniform items at Ft. Jackson. This was coupled with integration of the size selection results with ARN-IRM to create a Fully Integrated Supply Management solution at Ft. Jackson. The principal tasks of the project were:

- Requirements Analysis and Planning/Initial Site Assessment & Report. ARN SCM Systems Implementation, Integration & Training;
- VITUS/Smart 3D Whole Body Scanner Implementation; and,
- Project Management, Reporting and Presentations.

Additionally, this FTR encompasses support of 3D Whole Body scanning and uniform sizing at the Marine Corps Recruit Depots (MCRD) – San Diego (SD) and Parris Island (PI). The support included: 1) delivery and installation of a Cyberware 3D Whole Body Scanner (WBX), originally planned for installation at GLNTC, to MCRD-SD; 2) action by AdvanTech to integrate the WBX 3D scanner with the ARN IRM being installed at MCRD-SD; and, 3) focus of efforts on evaluating the use of the ARN Scan Digi-size software and the use of the accompanying uniform size selection software to determine if, and how, it could be enhanced and how comparable performance of uniform size selection could be accomplished at MCRD-SD and MCRD-PI. Because of the limited budget originally planned for Human Solutions involvement in the integration of the WBX 3D Scanner at GLNTC in the original STP, only limited support was possible for the redirected efforts for WBX integration at MCRD-SD and MCRD-PI.

1.2 Technical Approach

The Apparel Research Network has developed innovative technological solutions resulting in improved recruit clothing supply chain management processes within DLA. As demonstrated with this short-term project, additional opportunities to improve inventory accuracy rates were still available. The CIIP, Ft. Jackson, SC has served as a U. S. Army test site for the integration of these existing systems and the development of new solutions that bring even greater efficiencies to the recruit clothing supply chain management process.

The main goals of the ARN 3D scanning research initiatives are: 1) establish base-line information for future contracting and manufacture of uniforms; 2) identify the correct uniform sizes required to reduce stock levels and increase efficiency; and, 3) enhance operations and the effectiveness for the complete uniform supply chain and thus drastically reduce costs in the overall process. The main emphasis to-date in optimizing the military uniform supply chain has been research and evaluation of incorporating a whole body scanner for automatic body dimension extraction and uniform garment size prediction.

In recent years 3-D body scanners and 3-D body scan data have become available and used as a basis for the optimization of products and product development processes. 3-D body scanning uses the individual body as a basis for automatic body measurement extraction and automatic garment selection. Compared to traditional body

measurement, 3-D body scanning offers the opportunity to get much more complete and accurate measurement data about shapes and sizes.

This information can be used for automatic size selection and further advancement of size charts and optimization of pattern design for the US Army uniform garment items. Additional information, e.g., such as extended sets of body measurements, postural information or body shape, becomes immediately available with 3-D body scanning and can beneficially support traditional body measurement statistics and garment size design. The benefits from application of 3-D body scanning for garments are visualized in Figure 1 - Body Scanning & Value Chain Relationships.

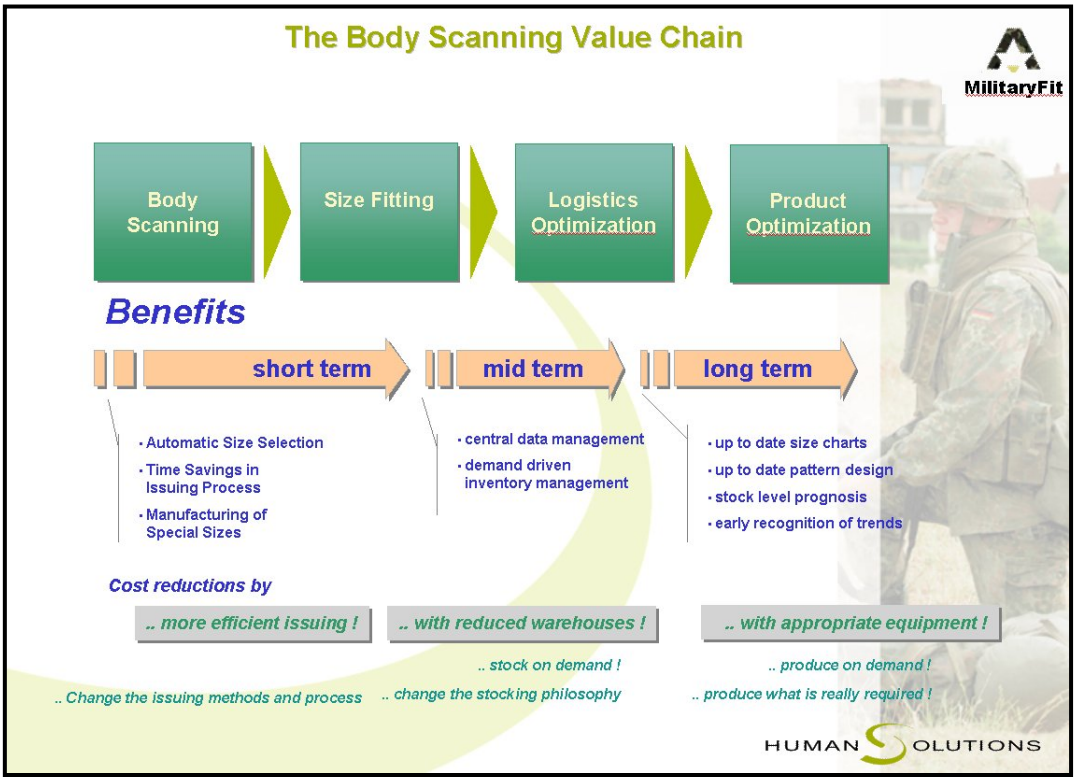


Figure 1: Body Scanning & Value Chain Relationships

The anticipated benefits center on improving inventory accuracy, ease of use and faster processing of recruits through the issue stations, faster and more efficient forms scanning, and incorporation of 3D Whole Body Scanner predicted sizes into the Phase II Uniform issue forms. These enhancements and technology integration have ensured that recruit issues were accurately and quickly recorded, thus giving DSCP Item Managers better production requirements data. This in turn has lead to more accurate wholesale-local inventory requirement predictions and allows for better management reports such as fill rate reports.

1.3 Summary of Highlights/Results

The research efforts conducted during this STP included several objectives focused on installation and integration of 3D Whole Body Scanning, development of Automatic Size Prediction for Phase II Male Army Dress Uniform Items at Ft. Jackson and enhanced use 3D scanners in use at the MCRDs for the US Marine Corps. The research completed and changes/enhancements made as a result of this STP have contributed to better production requirement data based on provision of accurate and consistent body measurements made using body-scanning technologies. Summary of key research results includes the following:

- The initial integration of size prediction rules extracted on the basis of available Technical Specifications for the selected Phase II male dress uniform items and the Army TM 10-227 Fit Manual (Army Technical Manual for Fitting Uniforms) did not provide sufficient information for accurate uniform size selection.
- Size selection rules were developed and refined to improve speed and accuracy of issuing processes used by 3D Whole Body scanning technologies for collecting and analyzing issued size data.
- The size prediction rules were validated and optimized for 3D Army male dress uniform items and the goal to reach 95% fitting rate with respect to the +/-2 size metrics was successfully accomplished.
- The scan data provide essential information for future refinement and update of uniform tariffs to provide necessary information to optimize contracting activities for manufacture of male dress uniform items.
- Cyberware scans of MCRD-SD and MCRD-PI can be transformed into a format that can be read and processed by Human Solutions ScanWorX body measurement extraction software.
- Merlin software was developed to provide support for routine uniform issue and accounting procedures incorporating automated capture of predicted sizes.

In summary, the overall concept, applications and integrated systems approach incorporating VIM/Wholesale Local, electronic forms management, use of hand-held terminals and the 3D Whole Body Scanner was well received and accepted by the personnel at the Ft. Jackson CIIP, and the Recruit Training Centers at MCRD-PI and MCRD-SD. Following completion of this project, support has been extended via on-going maintenance as directed by DSCP and refinements continue to be made to fine-tune operational support and efficiency of the supply chain activities.

2 Introduction

ARN VIM IRM systems were fully installed, operational, and fully integrated with Human Solutions' VITUS/Smart 3D Whole Body Scanner. The integrated approach captures body measurements of all but a very few individual soldiers each month, and converts the measurements into sizing data, which is used for preparation of an issue scan form for each soldier. The systems support the functional requirements of the local wholesale supply chain management for recruit clothing. The integrated system provides information on issues to the ARN VIM system and is linked for inventory requisitioning purposes to the Defense Supply Center Philadelphia's (DSCP) VIM–ASTRA, for transaction validation, and the Standard Automated Material Management System (SAMMS) through ISDN and Internet links.

2.1 Project Approach

The AdvanTech, Inc. and Human Solutions of North America, Inc, project team accomplished the implementation of the VITUS/Smart 3D Whole Body Scanner and its integration with ARN-IRM at the CIIP, Ft. Jackson using Work Packages (WP) 1, 2, and 5 with subordinate tasks from the original Great Lakes Naval Training Center proposal. The same Project Team provided project support for implementation and evaluation of the WBX Scanners at MCRD-SD and MCRD-PI using WP 3 with subordinate tasks.

2.1.1 WP 1: Requirements Analysis and Planning

The efforts associated with this Work Package in the original STP were redirected for AdvanTech, Inc. to provide project support for integration of the 3D Whole Body Scanner with ARN IRM at the Ft. Jackson CIIP. Under this work package the project team evaluated current operations and developed requirements for initial implementation activities, determination of how to optimally support the operational processes of male dress uniform issuing and stock replenishment, and the subsequent analysis of results achieved.

This enabled AdvanTech and Human Solutions to fully understand how best to tailor the ARN VIM-IRM system capabilities and coordinate the subsequent installation of the scanning technologies. The task list for this Work Package included the following activities:

- Requirements Analysis for Ft. Jackson CIIP Operational Support;
- "As is" Process Analysis, Mapping and Documentation;
- Develop Pilot Installation Plan;
- Define Location and Pilot Processes;
- Define Issue Items And Size Tables For Integration In Automatic Size Selection;
- Define The Evaluation Scenario for Human Solutions VITUS/Smart and Cyberware WBX Scanning Technologies;

- Implementation Report with Recommendations for Process Redesign; and,
- Define Integration Scenario And Recommendations Using ARN SCM Solutions Previously Developed.

Activities for each of these tasks are described in the following sections of this report.

2.1.2 WP 2: ARN SCM Systems Implementation and Integration

The efforts associated with this Work Package in the original STP were redirected for AdvanTech to provide project support for tailoring of the ARN IRM at Ft. Jackson to facilitate integration with the Human Solutions 3D Whole Body Scanner. In this WP the project team accomplished the tasks and activities associated with the integration of the existing ARN-IRM at Ft. Jackson with the Human Solutions' VITUS/Smart 3D Whole Body scanning technology. The task list for this Work Package included the following activities:

- ARN Base Systems Tailoring & Networking;
- Extend the ARN LAN; and,
- Scan Forms Interface with the 3D Whole Body Scanner.

2.1.3 WP 3: Cyberware WBX Body Scanner Implementation

The efforts associated with this Work Package in the original STP were redirected for AdvanTech and Human Solutions to provide project support for implementation of WBX Scanner at MCRD-SD and accompanying efforts for research and refinement of the size selection processes for Marine Corps male uniform issue processing at both MCRD-SD and MCRD-PI. This work package provided for implementation of the Cyberware WBX 3D body Scanner and ARN Scan software for the evaluation of its effectiveness for male dress uniform issues in comparison with manual measurements. The task list for this Work Package included the following activities:

- Installation of Cyberware WBX Scanner and Training;
- Initial Integration of Cyberware WBX 3D Scanner;
- Review and Evaluation of Data Collection;
- Automatic Body Measurement Extraction;
- Automatic Uniform Size Selection; and,
- Operational Validation and Evaluation.

2.1.4 WP 5: VITUS/Smart Implementation

In this WP the project team implemented the Human Solutions VITUS/Smart 3D Whole Body scanning technology at Ft. Jackson and evaluated its effectiveness for male dress

uniform issues in comparison with Cyberware Whole Body Scanner (WBX) and manual measurements. The task list for this Work Package included the following activities:

- Installation of Human Solutions VITUS/Smart 3D Body Scanner and Training;
- Initial Integration of VITUS/Smart 3D Scanner;
- Initial Data Collection;
- Automatic Body Measurement Extraction;
- Automatic Uniform Size Selection; and,
- Operational Validation and Evaluation.

2.1.5 WP 6: Project Management, Reporting and Presentation

Under this work package the project accomplished the tasks and activities associated with project management, reporting and research results presentation. This work package provided for the tasks and activities associated with project management, reporting and research results presentation. Both Human Solutions and AdvanTech were responsible for completing these tasks. AdvanTech served as lead for coordination of drafting technical project reports that were submitted to meet specified deliverables and both companies were separately responsible for IPRs and CFSRs. The following activities were accomplished as part of this WP:

- Project Management;
- Management Reporting;
- Interim Progress Reports;
- Contract Funds Status Reports; and,
- Final Technical Report.

2.2 Short Term Project (STP) Objectives

The purpose of the Short Term Project (STP) was to provide support for conducting research at Ft. Jackson related to introducing 3D Whole Body scanning and measuring technology for automatic size prediction of military uniforms in the issuing process. The STP contributed to the ARN goals to further improve the efficiency of the military supply chain and achieve benefits resulting from using scanning technologies with enhanced manufacturing effectiveness.

The project's research effort implemented and evaluated 3D Whole Body scanner technologies for optimizing uniform measurement and fit prediction processes. Use of 3D scanning technologies to measure recruit bodies, as the basis for automatic uniform size prediction for initial and subsequent issue of dress uniform issues for men, reduced time required for the issuing process. The objectives of the STP were to evaluate and

integrate the VITUS/Smart 3D Whole Body scanner technology into the U. S. Army recruit uniform measurement and issue process.

The key objective was to quickly and accurately predict the best fitting size for dress uniform issue for male recruits at the Ft. Jackson CIIP. The results were incorporated into the DLA's ARN Apparel Supply Chain and ARN Asset Visibility System (AAVS) DataMart (data warehouse) to affect a faster and more accurate issue process.

The issue processes developed and implemented incorporated the evaluation of the measuring, issuance and fitting processes, the impact on achieving better fitting uniforms, and expansion and refinement of the related AAVS database for future use for improved uniform design and manufacture. This data provides benefits to all of the military services, since the sizing data is not related to the ordering and issuing military department. The focus and objectives of the research were as follows:

- Establish accurate and consistent body measurement by use of VITUS/Smart body scanning technologies.
- Link Human Solutions VITUS/Smart 3D Whole Body scanning capabilities to ARN Integrated Retail Module (ARN-IRM) information systems for recruit information data capture by local personnel, including linking data collection to ARN systems using Autodata scan forms and CabinetNG software to capture issues at Ft. Jackson.
- Incorporate audit trails for all uniform items issued to ensure validation and verification of information for the business case, and to ensure all issues were properly accounted for and reported.
- Optimize availability of male dress uniform items to improve speed and accuracy of issuing processes by use of the 3D Whole Body scanning technologies.
- Conduct baseline and subsequent research to determine the improvement in speed and accuracy of the recruit issue capture process for male dress uniform items using the 3D Whole Body scanning technologies and the related ARN systems for recruit identification and item issuing.
- Conduct research to develop and establish correct and accurate uniform size selection for use by the U. S. Army and military departments.
- Develop recommendations to integrate automatic uniform sizing results into existing ARN SCM solutions.

In summary, the research efforts conducted during this STP included several linked activities. Completion of the following activities enabled the ARN Project Team members to achieve the objectives:

- Implemented and set-up an ARN Local Area Network (LAN) providing interfaces for integration and linking of Human Solutions VITUS/Smart

technologies into operational processes at Ft. Jackson and into the ARN IRM Supply Chain Management (SCM) systems (outside the fire wall of Ft. Jackson existing 'legacy' systems).

- Installed the Human Solutions VITUS/Smart hardware and software at Ft. Jackson.
- Conducted research on measurement rules and integration of Uniform Size Tables and Size Selection Rules at Ft. Jackson and at USMC Recruit Depots – Parris Island and San Diego
- Conducted research on the integration of already existing dress item Size Tables and Size Selection Rules previously developed and formulated by ARN research activities and adapted them for automatic size selection processes at Ft. Jackson.
- Validated and optimized 3D uniform size prediction capabilities for the Army.
- Completed technical reports summarizing activities completed, and results achieved and documented.
- Developed the Merlin System as the critical interface software between ScanWorX and ARN-IRM for passing recruit information to ScanWorX, and receiving the measurement extraction and size prediction information into ARN-IRM.

2.3 Scope of the Project

2.3.1 VITUS/Smart 3D Whole Body Scanning Implementation at Ft. Jackson

The scope of the body scanning implementation activities at Ft. Jackson is shown in Table 1 – Whole Body Scanning Scope and Implementation at Ft. Jackson. Following installation of the hardware and software integration, recruits were initially scanned with the new VITUS 3D Whole Body scanner in December 2003 at Ft. Jackson.

The purpose of these scans was twofold. First, it allowed for the capture of measurements and the subsequent conversion to clothing sizes. This data was then captured and converted to stock numbers. Second, it was an opportunity for the Phase II Uniform personnel to become accustomed to the scanning process and allow for the modification of the Phase II Uniform issue procedure to take advantage of the new scanning process.

The next step was to design an interface that would take the predicted Phase II Uniform sizes and populate a recruit specific issue form with the predicted sizes. Additionally, an interface between the recruit's identification data from the ARN Control Panel needed to interface with the ScanWorX body measurements and size prediction software (XFIT Army 3D Body Scanner application) software. This was required in

order to create a file with the recruit's sizes and identification data that would be imported back to the ARN Control Panel for production of the issue scan form.

Table 1: Whole Body Scanning Scope and Implementation at Ft. Jackson

Month/Year	Function
September 2003	A Site Visit was held at Ft. Jackson for the purpose of reviewing the locations and preparations of the VITUS/Smart scanner installation.
October 2003	Human Solutions and AdvanTech, Inc. conducted an on-site "As Is Process Analysis" of the complete issuing process for male dress uniform items (October 21st-22nd).
December 2003	Human Solutions installed the VITUS/Smart 3D Whole Body Scanner at Ft. Jackson on December 2nd and 3rd and training of the personnel on the 4th and 5th of December. First scans of recruits were made.
February 2004	ARN Review Meeting at LMI in Mc Lean on February 19th
February 2004	Initiated development of Merlin System software for integrated operation of ARM-IRM and VITUS/Smart.
March 2004	Implemented the data exchange interface with ARN-IRM and generated size prediction data from the VITUS/Smart scanner. Conducted a comparison of manual measurement by the tailors and measurements produced by the scanner (approx. 300 recruits).
April 2004	Started the operational phase at Ft. Jackson (April 7th)
May 2004	Implemented split processing of scanning and size prediction, and simplified SSN selection to speed up the scanning and scan form printing process.
August 2004	AdvanTech hired a Customer Service Engineer at Ft. Jackson to provide on-going support to the ARN Systems and the scanning process.
November 2004	Scan rates were made available on the ARN web site: www.arn2.com

2.3.2 3D Whole Body Scanning Support at MCRD-SD and MCRD-PI

The scope of the 3D Whole Body scanning support at MCRD-SD and MCRD-PI is shown below (see Table 2 – Whole Body Scanning Support at MCRD-SD & PI). The scope of the project included support for the replacement of the Cyberware WBX 3D Whole Body Scanner with a new, upgraded WBX 3D Whole Body Scanner, integration of ARN-IRM to the new system. Additionally, the research scope included analysis of WBX scan file formats to determine importability and comparability with Human Solutions scans.

Table 2: Whole Body Scanning Support at MCRD-SD & PI

Month/Year	Function
September 2003	AdvanTech, Inc. planned and coordinated the replacement of WBX Scanner at MCRD-SD
September 2003	AdvanTech and Human Solutions analyzed Cyberware scans and measurements at MCRD-SD & MCRD-PI for import to Human Solutions ScanWorx
October 2003	AdvanTech, Inc. implemented hardware, software, and communication components preparatory to upgrade of the MCRD-SD legacy system to ARN IRM, including a new interface to the new WBX 3D Whole Body Scanner.
November 2003	AdvanTech, Inc. completed alternate size selection tables at MCRD-PI, placed into production, and evaluated for impacts on accuracy.
December 2003	AdvanTech, Inc. and Cyberware completed installation of the new WBX 3D Whole Body Scanner at MCRD-SD,
February 2004	Human Solutions converted *.iv-files from the WBX-Scanner into readable ScanWorX files for further processing and comparison of the body measurements. All WBX scans were processed and the deviations in most body measurements were found acceptable for further use in size selection.
March 2004	AdvanTech, Inc. completed installation of hardware, software, and communication components, and upgraded the MCRD-SD legacy system to ARN IRM, plus a new interface to the new WBX 3D Whole Body Scanner.

Month/Year	Function
April 2004	AdvanTech worked with Cyberware on the development of the interface between the Cyberware scanner and the ARN-IRM software at MCRD-SD. The interface is comparable to that previously installed at MCRD-PI.

2.4 System Architecture & Operations

2.4.1 Overview of System Architecture

The ARN VIM-IRM System architecture, as discussed and illustrated in this section, was installed and operational prior to integration of the VITUS/Smart 3D Whole Body Scanner. The overall focus of the ARN Asset Visibility System (AAVS) and AAVS DataMart is on the collection of data in a shared repository for use by the Item Managers at the retail (RTCs) and wholesale (DSCP) levels.

The ARN systems incorporated in this integrated approach are designed to provide all users with clear visibility of all recruit-clothing assets throughout all segments of the supply chain. Further, the systems extract operational data from the Clothing & Textile (C&T) server and use this information as the basis for supporting decisions by the Item Managers for supporting operational needs. Thus, the Virtual Item Manager (VIM) system provides the decision support capabilities for wholesale inventory management requirements.

In the efforts that have been accomplished to-date, VIM provides an independent network of servers linking C&T SAMMS, AAVS DataMart, and ARN-IRM at the local level, into an integrated system for recommending relocation of uniform items from “depots” to the supported RTCs. To create this integrated systems approach, the base ARN-IRM was modified to use data from the AAVS DataMart for decision support and management of inventory in the supply chain.

A web-based interface was incorporated with the ARN Virtual Item Manager. VIM was developed to provide a common user interface for Item Managers to use to manage the supply chain using inventory data flowing from the retail and wholesale levels to the AAVS DataMart. The Virtual Item Manager (VIM) as developed uses a combination of computer and web-based software that provides Item Managers with the supply chain and inventory information necessary to expedite distribution of assets in support of customer needs.

The ARN VIM-IRM, was previously implemented at Ft. Jackson for the processing of MILSTRIP transactions through VIM. After processing, the issue information in MILSTRIP format is transferred to ASTRA and then processed through SAMMS.

2.4.2 General Concept of Operations

ARN VIM-IRM provides restock recommendations based on Ft. Jackson projections of the numbers of recruits to be trained/processed, and the actual clothing issues information transmitted to the AAVS Data Mart. System relationships and data flows are illustrated in Figure 2 – ARN/VPV System Interfaces & Data Flows.

The Ft. Jackson CIIP's transactions are sent via DSL Internet connection over a secured Virtual Private Network (VPN) to VIM. VIM then processes the CIIP issue information, adjusting the quantities of individual NSNs available for issue, generating replenishment requirements, and manages the local inventories. Issues, Receipts, Adjustments, and Redistribution Requests are transmitted into SAMMS daily, via Clothing & Textiles' (C&T) VIM - ASTRA system.

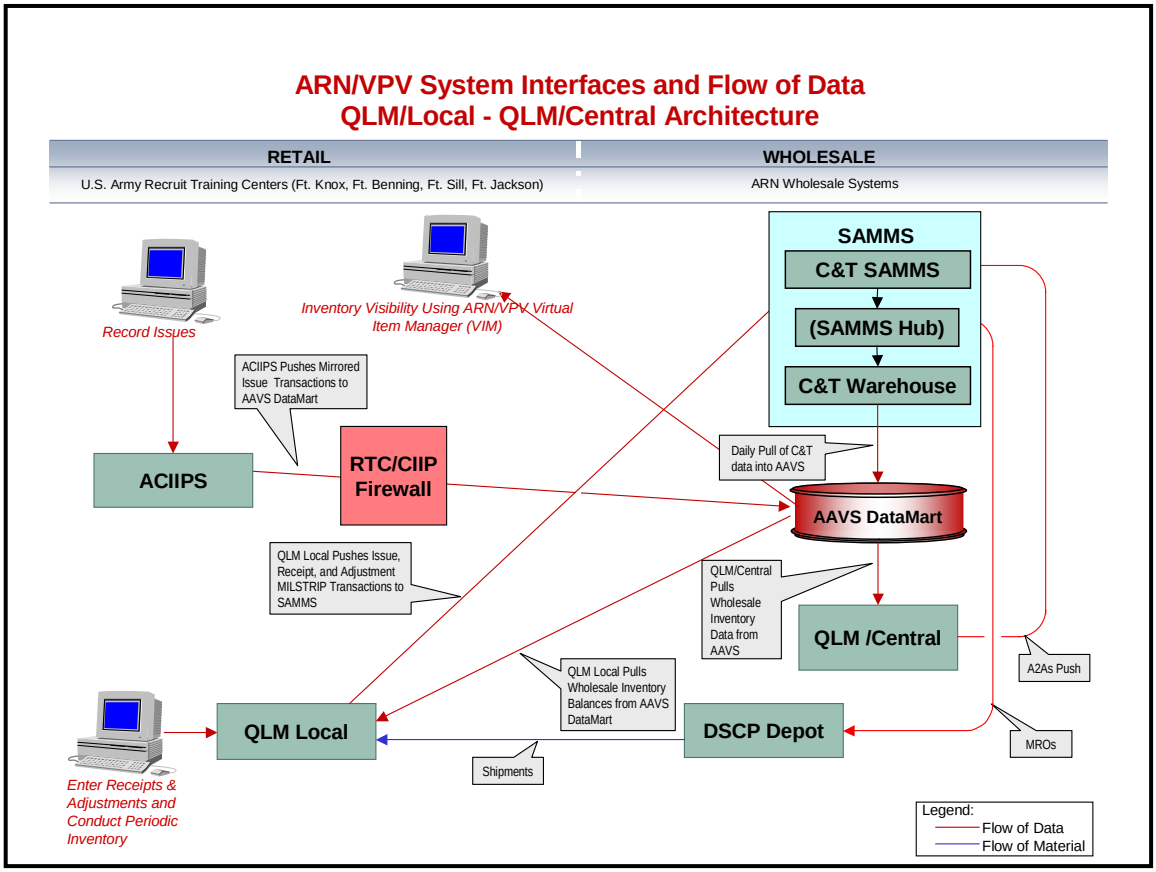


Figure 2: ARN/VPV System Interfaces & Data Flows

As illustrated above in Figure 2, there is no interference with the CIIP operation, and minimal impact on current system operation and resources. The objective was to make the transfer of asset ownership with inventory replenishment responsibilities to DSCP and implementation of ARN – IRM as transparent as possible to the CIIP. As designed, VIM pulls wholesale inventory stock levels from the AAVS DataMart to determine ship-points (depots or bill & hold locations) for the redistribution requests.

ARN-IRM operates outside the CIIP firewall, and does not require access to the CIIP Local Area Network (LAN) or the campus area network (CAN). The CIIP's procedures have remained the same, with the addition of periodic inventory using handheld terminals and the entry of receipts and adjustments directly into ARN - IRM.

CIIP personnel have full visibility of DSCP's wholesale-local inventory. This is provided through the Virtual Item Manager (VIM) Internet browsing capability into the Apparel Asset Visibility System (AAVS) DataMart. Finally, AdvanTech can use either the ISDN line via secure Internet connections or a dial-up telephone line if necessary to access the ARN VIM-IRM systems for the purpose of system software maintenance.

2.4.3 Fully Integrated ARN Supply Chain Management (SCM)

The figure below, Figure 3 – Fully Integrated ARN Supply Chain Management (SCM), illustrates the data flows associated with the ARN SCM systems when fully integrated with the VITUS/Smart 3D Whole Body Scanner at Ft. Jackson.

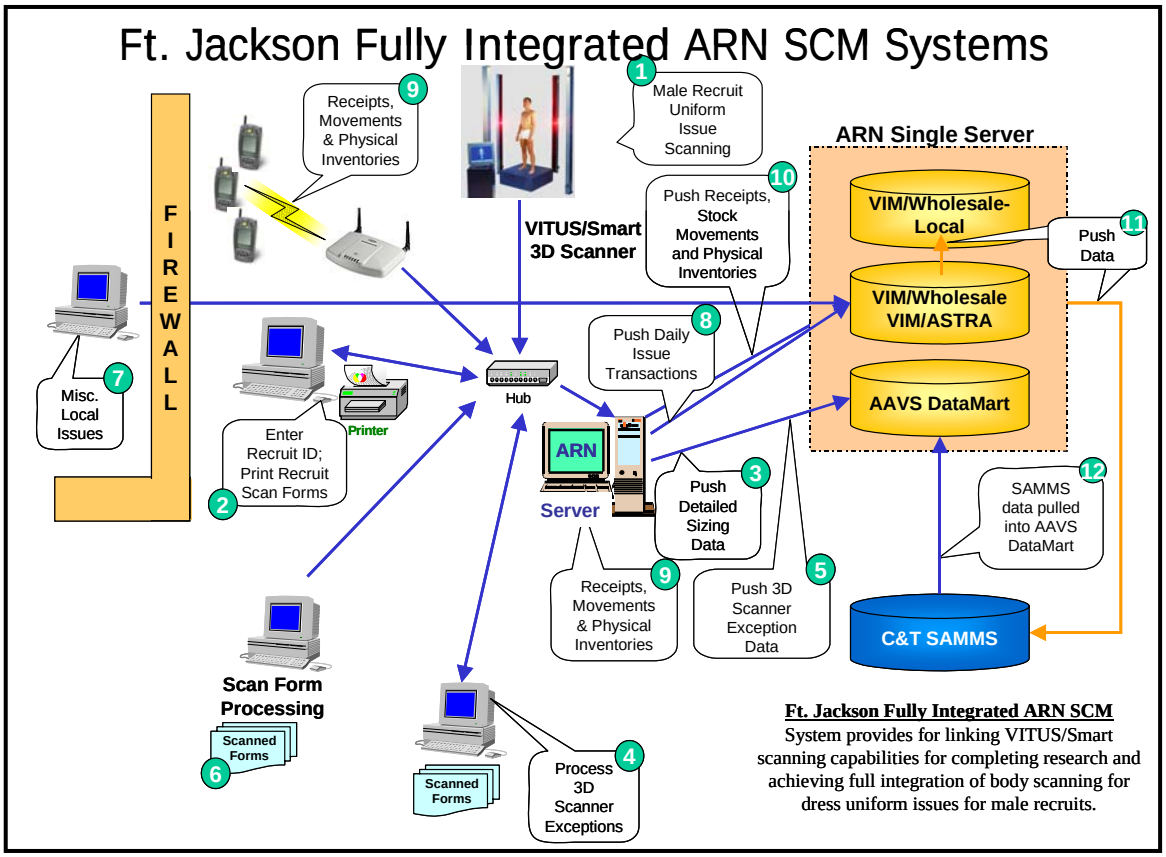


Figure 3: Fully Integrated ARN Supply Chain Management (SCM).

The whole body scanner, when inserted into the SCM process, receives soldier identification information from the ARN Merlin software that manages the accession of recruits into the scanning and issue process. Following the scanning process the recruits issue scan form is printed with the predicted sizes for the range of items that are to be issued, the issues are made, and the ARN SCM system proceeds to process issues and effect replenishment actions. This processing is described further in subsequent sections of this report.

2.5 Implementation of Fully Integrated ARN Supply Chain Management (SCM)

The figure shown below, Figure 4 – Timeline of STP, is a summary timeline showing the major tasking completed as part of the original proposed STP. The tasking includes installation of the VITUS/Smart 3D scanner at Ft. Jackson and the related work to accomplished by Human Solutions and AdvanTech, Inc. for Work Packages on requirements analysis, integration to ARN IRM systems, and sizing tables and analysis of results achieved at Ft. Jackson, and both MCRD-SD and MCRD-PI.

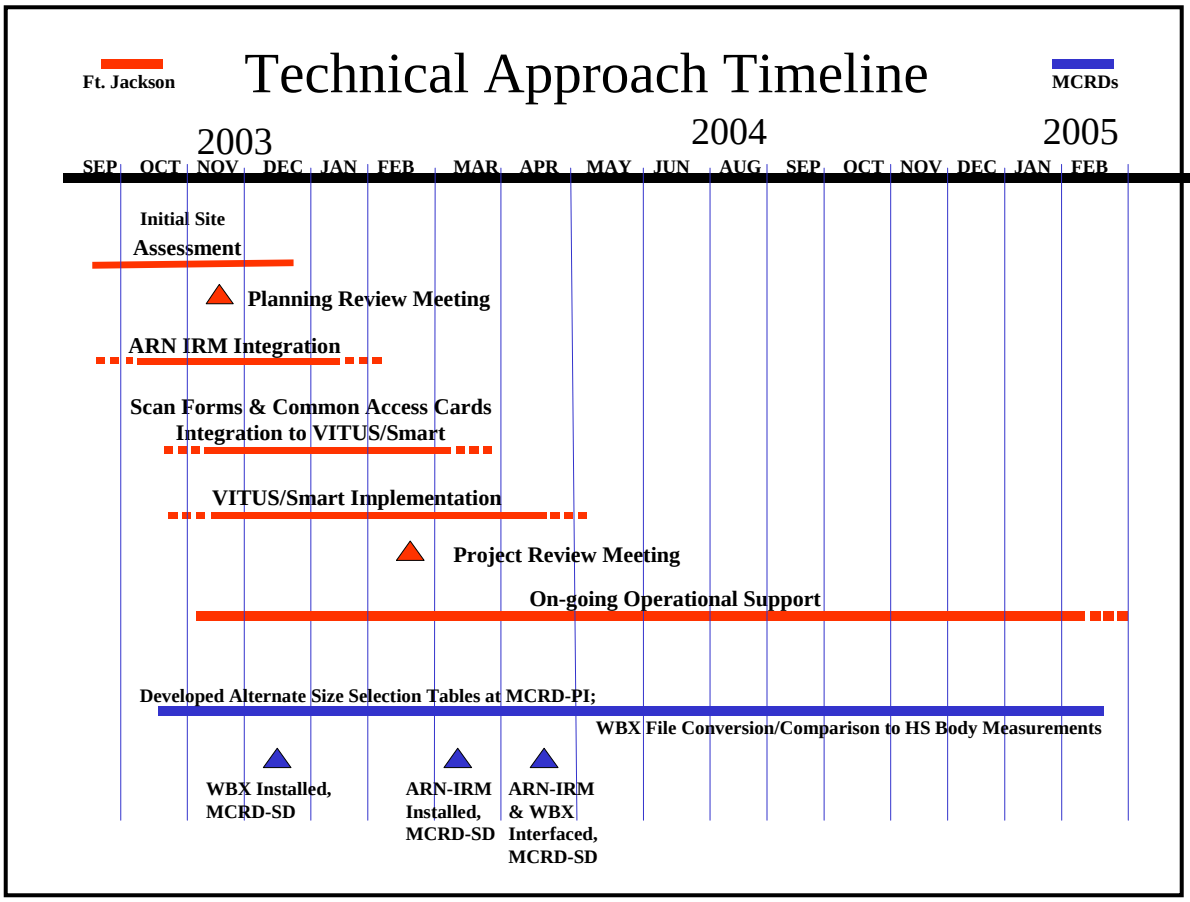


Figure 4: Timeline of STP

The following sections of this Final Technical Report provide information on: the tasks and activities accomplished at Fort Jackson involving the implementation of the Human Solutions 3D body scanner and integration to ARN IRM systems; and the tasks and activities accomplished at MCRD-PI and MCRD-SD involving the upgrade of the 3D Cyberware scanner at MCRD-SD and the WBX file conversion/comparison to the results achieved using the Human Solutions ScanWorX software. These separate paths are highlighted in the figure above.

3 VITUS/Smart 3D Body Scanner Integration at Fort Jackson

3.1 Orientation

Subsequent to the award of the delivery order for this project, Human Solutions of North America, Inc. and Human Solutions GmbH (Germany) traveled to MCRD-PI on July 14, 2003 and attended the ARN Workshop, July 15-17, 2003, Columbia, SC. This provided the opportunity for Human Solutions personnel to better understand the work requirement at Ft. Jackson and to build a personal profile of operations using the WBX 3D body scanners at MCRD sites.

Following the activities proposed in the original Delivery Order and subsequent modifications, AdvanTech and Human Solutions worked collaboratively on integration of VITUS/Smart & ScanWorX software to ARN VIM-IRM and the AAAVS DataMart for capture and integration of Human Solutions 3D Whole Body Scanner (VITUS/Smart) data outputs and results capture at Ft. Jackson. Human Solutions initiated collection of Army sizing tables, and started analysis of the data necessary to construct size selection tables for use with the ScanWorX software.

Human Solutions performed analysis associated with the installation and set-up of the Human Solutions 3D Whole Body Scanner (VITUS/Smart) at Ft. Jackson. Human Solutions of North America traveled to Ft. Jackson on September 17, 2003 for site review and necessary preparation for the scanner installation. This provided the opportunity for Human Solutions to discuss and fix the spatial requirements, necessary modifications of the room, in preparation of the installation of the VITUS/Smart 3D body scanner.

3.2 Architecture

The Human Solutions VITUS/Smart 3D Whole Body Scanner integrated solution consists of 2 Windows XP workstations running the ScanWorX software and the 3D Whole Body Scanner. This system is linked to the ARN VIM/IRM, using AdvanTech's Merlin program to read both body measurements and predicted sizes from the ScanWorX/Fashion Fit software.

The Merlin program then generates the recruit requisition, which contains the individual recruit's personal data along with the predicted sizes and alternate sizes. This data is then used to populate the recruit's issue forms. The Merlin program also lets the operator select the platoon that is to be scanned and then passes the platoon listing to the Human Solutions PickList program. The operator uses the PickList program to select the recruits as they are scanned. The development and implementation of the Merlin software is described in Section 4 of this report.

After being scanned, the recruit proceeds down the issue line with the issue scan form for issues and fitting. CIIP staff marks sizes of items issued on the issue forms as items are issued. At the last station, the scan forms are verified, collected and scanned. The

issue data extracted from the scan forms then creates the recruits clothing records, drives replenishment, and future tariffs.

The following figure provides an illustration of the relationship of information system components installed at Ft. Jackson as part of this STP. The diagram indicates the various stock movements affected by the implementation of the Human Solutions VITUS/Smart 3D body scanning technologies and related ARN SCM systems.

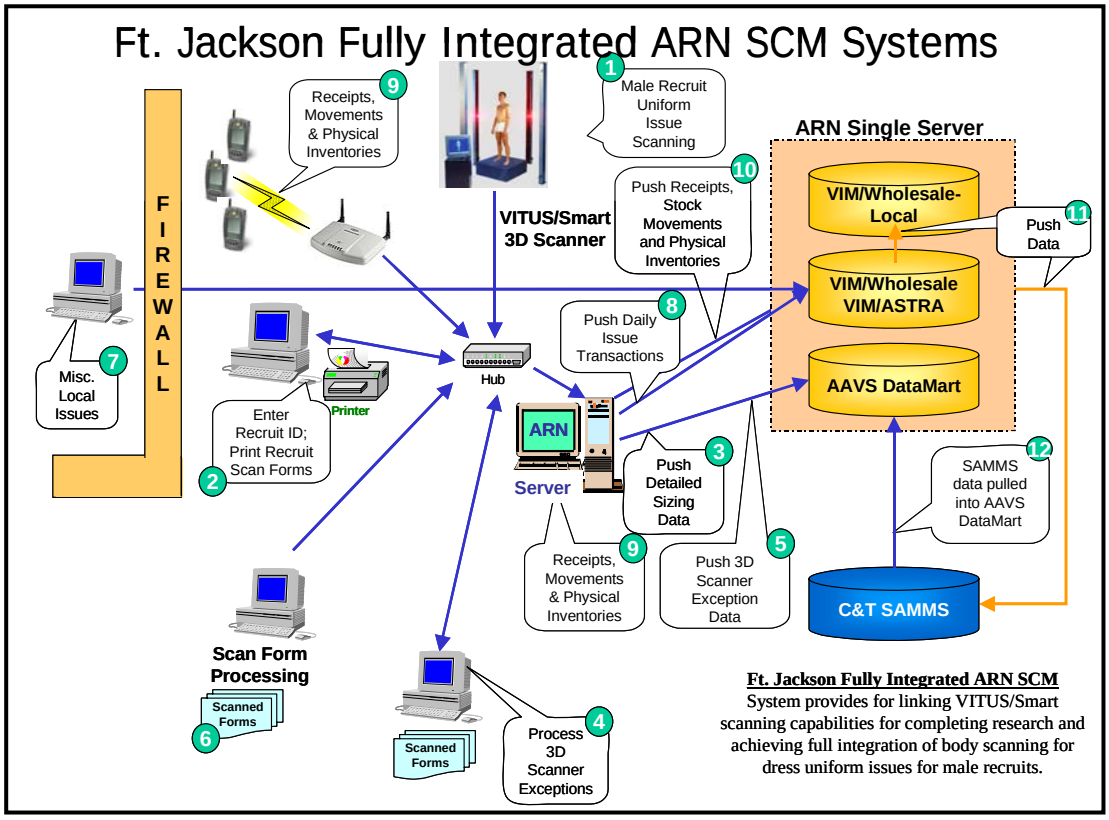


Figure 5: Ft. Jackson Information Systems Architecture and Data Flows

3.3 Review & Analysis of the Current Process

3.3.1 Overview

Evaluation of current operations was a prerequisite to the development of the requirements for implementation of the VITUS/Smart body scanner at Fort Jackson. Key points of analysis were the total process for recruits to go through, the actions taken and time allotted for each portion, if recruits were to be processed serially or in a batch mode, how measurements were taken and recorded, how fit was assessed, how problems would be addressed in the event an improper size prediction is made, and how returns and exchanges would be processed.

The existing process for the male dress uniform issue was observed during a two-day on-site visit on October 21-22, 2003. The male uniform size selection, fitting processes,

and fitting "philosophy" were analyzed. Two important aspects were taken into consideration for the analysis:

- The entire process and the spatial on-site conditions to analyze the complete workflow; and,
- An analysis of the task details (work description, number of personnel, input/output of information, processing time, exception handling) of each station with respect to three recruits (S, M, L sizes) followed step by step through the entire issuing process.

The Ft. Jackson operations group is responsible for uniform issue processing for approximately 38-40,000 male and female recruits per year.

3.3.2 Phases for Clothing Initial Issue Point Processing

The entire basic training cycle is an 8-week period separated into Phases I and II. In the Phase I Issue Process, each soldier is issued all clothing needed for weeks 1-5 of his or her respective training cycle.

The Phase I uniform issue process starts in the morning with recruits in groups of approximately 90 instructed in the subsequent tasks. Some of the recruits were instructed in taking manual measurements (Neck, Chest, Waist, Right Sleeve Length, Head Girth). Those recruits then take the manual measures for the entire group. The measurements and personal data of the recruit are written down in the “Clothing Worksheet.” In addition, the recruits are asked for body height, weight and shoe size. After measuring, the recruits go to the first station to receive their first clothing items, PT-Jackets and PT-Trousers.

Recruits arrive on Day 2 of their 4-day induction processing cycle. Phase I issues consist of all PT clothing, underwear, and field clothing. The Phase II Issue process follows completion of Phase I training. Recruits return to the CIIP in week five of training for the second issue of bag items. Again they are processed in the CIIP to receive their uniform allotment. These include shoes, gloves, short sleeve shirts, slacks or skirts, coats, overcoats and caps.

Within a regular Phase II Clothing issue, after 4-5 hours, the recruits have received all items. They then have to wait for the alterations. Approximately 2 hours later all recruits have completed their clothing items bag check, and one after the other they go into the “final fitting check room” where the Drill Sergeants of each group check the quality of the clothing items. If additional alterations are necessary, these are made immediately within the room.

The 3D Whole Body Scanner integration was essential for the fast and efficient processing of male recruits through the Phase II uniform issue process. Additionally, sizing data captured during the scanning process was stored for eventual use by DSCP. This data can be used to adjust clothing patterns, and adapting for the demographic sizing challenges faced by the CIIPs.

The first phase of the scanner installation was dedicated to the task of collecting initial information in order to provide data for completion of the size selection tables and development of the size prediction rules, and thereby facilitate automatic selection of the item size to be issued in the male Phase II issue process.

3.3.3 Site Conditions Phase II Clothing Issue

The sequence of issue before introduction of 3D body scanning capabilities was as shown in the figure below:

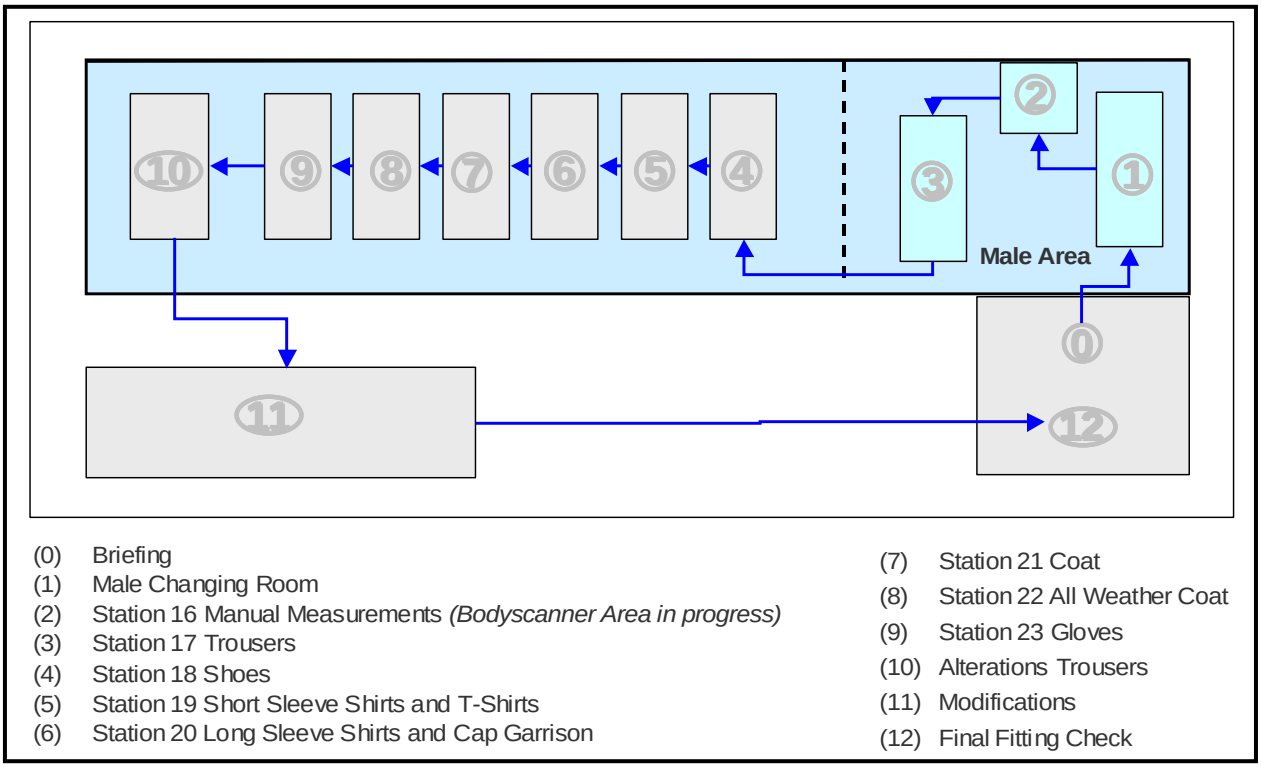


Figure 6: Workflow Ft. Jackson Phase II Clothing Issue, Male Recruits

3.3.4 Review of Operations at Each Issuing Station

To review the existing operations and processes in detail, three recruits were chosen one small, one normal, and one large, corresponding to sizes S, M, and L. They were accompanied through the whole process chain, including taking pictures and logging the characteristics of each fitting station. The results of this review are documented in Appendix D – Body Dimensions Used for Size Selection.

3.4 VITUS/Smart Installation

The key operational step in the project was the installation of the VITUS/Smart 3D Whole Body Scanner at Ft. Jackson. The pilot installation's initial data collection was the base for acquiring US Army male dress uniform sizing data and further operational validation of the automatic uniform issuing processes.

3.4.1 Definition and Preparation of Scanner Location

A decision on the location of the VITUS/Smart Body Scanner was made during the site visit on September 17th, 2003. During the visit the requirements for the scanner installation were discussed in detail and decisions on the following room modifications were made:

- Scanner Location – The scanner would be installed in the corner of the male changing room (Appendix F – Floor Plan of Installation Site). After some minor room modifications, this allows female recruits to also go through the scanner at a later point in time. The space allocated for the scanner and recruit flow is 164 x 194 inches (see floor plan on next page).
- Room modifications included the following:
  - Removal of the light fixtures to ensure a 10-foot high clearance;
  - Removal of the poles running along the wall;
  - Removal of benches, weight scale, and other objects in the required space;
  - Construction of a new wall to section off the scanner area;
  - Installation of a new power box beside the current one, as well as housing for the network connections;
  - Unscrewing the light fixtures that would shine light directly into the scanner; and,
  - Installations of a scanner enclosure with 2 doorways to ensure rapid processing of recruits and to protect the scan process from stray light.

The modifications were performed at Ft. Jackson by the middle of October 2003. Partitions were installed to separate the body scanning area from the male changing area as shown in Figure 12. The area was set up to scan male recruits to support the male Phase II Uniform issuing process. To be flexible for future requirements concerning female recruits, a second door to the scanner room was installed as well.

In addition to the modifications of the room the following points were considered and were accomplished:

- Network Connections – installed network connections between ARN VIM-IRM and the VITUS/Smart computers by October 12th.
- Furniture – Ft. Jackson provided two workstations (tables and chairs) to facilitate an operator working comfortably for an entire issue process that was later replaced and completed by newer workstations, and a shelf on which the recruits can deposit their belongings during the scan process.

In the October 21-22, 2003 site visit AdvanTech took part in the final review of the location of the scanner, projecting the communications components necessary to integrate ARN VIM-IRM and the scanner, and planning interface requirements.

The following figures show the newly integrated scanning room prepared by Ft. Jackson, where the scanner was installed (photo taken at the end of October 2003), and the scanner enclosure.

Figure 7: Ft. Jackson 3D Body Scanner Location

Figure 8: Ft. Jackson VITUS/Smart 3D Body Scanner

3.4.2 Installation of VITUS/Smart – Time Schedule

The installation time schedule for the VITUS/Smart 3D Whole Body Scanner is shown in the following table. Installation of the scanner was completed in the first week of December 2003. Since the trained personnel felt very comfortable with the system and the handling, a high throughput could be generated from the beginning. Until the closing of the issuing line before the year-end holidays, approximately 600 recruits could be scanned and the data with the issued sizes for each recruit was collected.

Table 3: Time schedule installing 3-D Body Scanner

Date	Action
Week 48	Delivery of the scanner parts to Ft. Jackson
Week 49: Dec. 2nd	Installation of the scanner configuration
Week 49: Dec. 3rd	Calibration of the scanner
Week 49: Dec. 4th & 5th	Training of Ft. Jackson personnel
Week 50	Start of the initial data collection

3.4.3 VITUS/Smart System Configuration

To achieve a high throughput, two PC Workstations are used in parallel as shown in the figure below. PC Workstation #1 is the Scan Station. The second workstation is the Fit Station. Thus, it is possible that while body measurements are extracted and the item sizes are predicted, the next recruit in line can be scanned simultaneously. With this approach the period of time recruits spend at the scanning station is reduced to a minimum. One staff person is responsible for checking the quality of the scan (no movements, correct clothing, correct posture, etc.), and for measurement extraction and size selection.

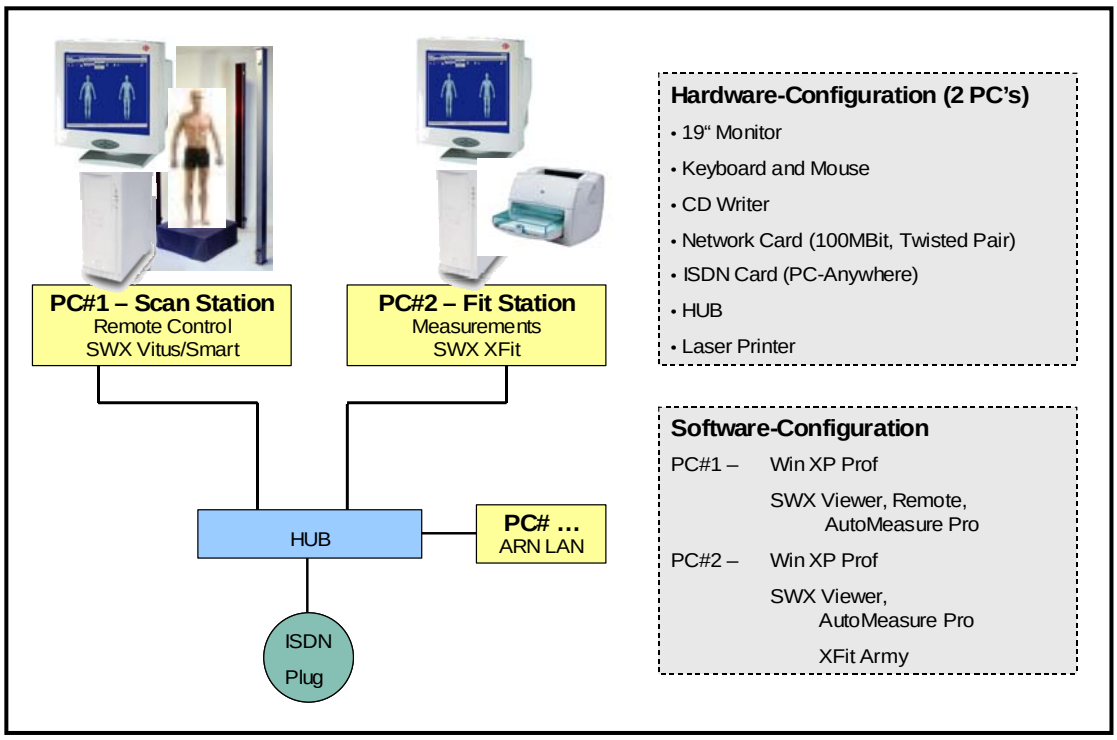


Figure 9: Ft. Jackson 3D Body Scanner Process – System Configuration

One of the most important things to speed up the process is a detailed explanation of the complete procedure in advance. Instruction posters support the verbal instructions. In addition, a mirror was made available within the dressing room for recruits to use to practice the scanning posture. Also manuals were compiled that allow the scan operator and any other user to quickly reference any problems and procedures.

3.4.4 3D Body Scanning Process and Data Flow

The scanning process, the exchange of information between the two scanner computers and the flow of information during the recruits scanning process is illustrated in the following figure. This figure illustrates the flow of data to match body measurements with sized items to input data to the sizing protocol.

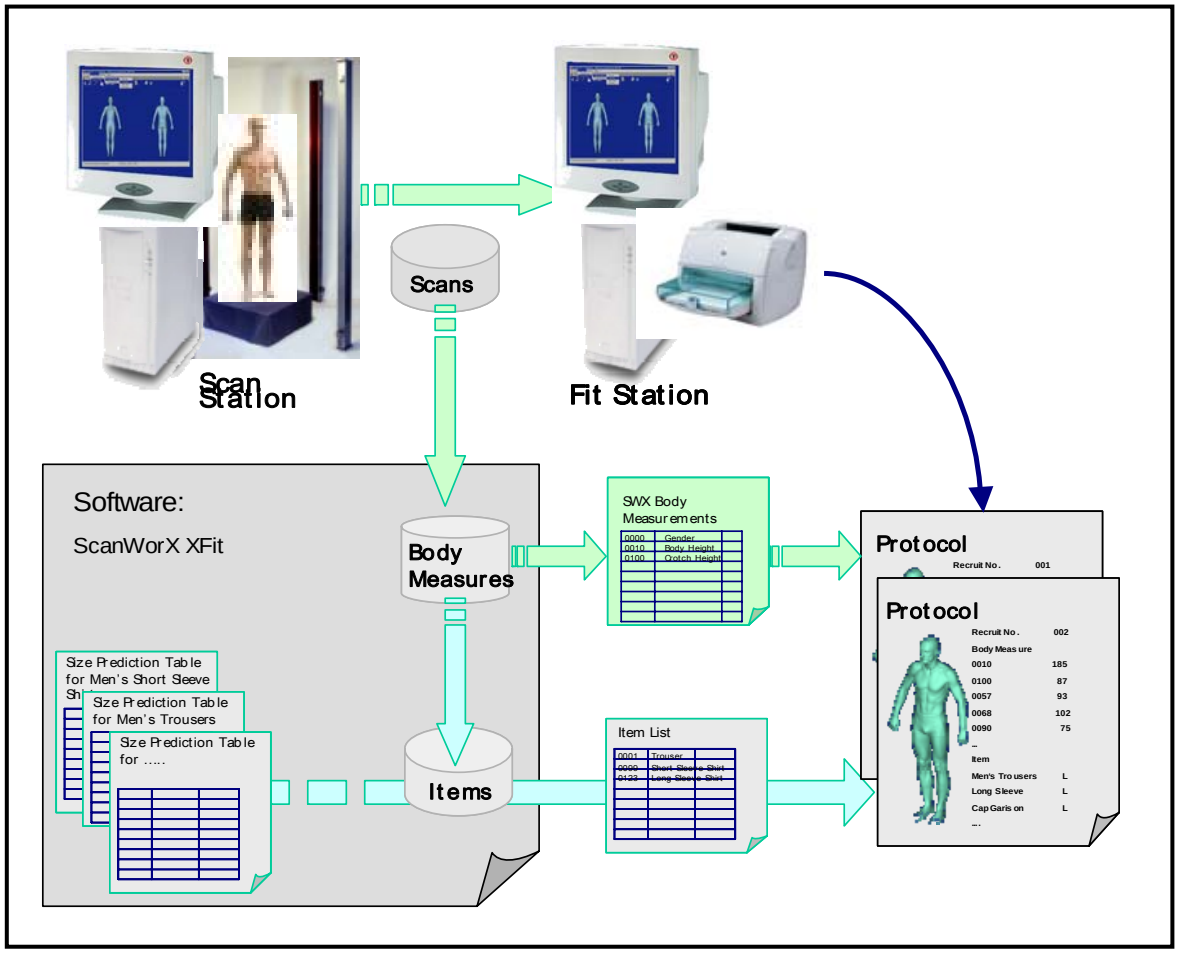


Figure 10: Ft. Jackson 3D Body Scanner Process – Data Flow

Human Solutions and AdvanTech worked on additional actions to improve process and appearance at Fort Jackson, and improved scanner throughput to one recruit each 0.75 to 1 minute. The main actions were:

- Splitting the scanning control software and scan data processing software to separate PC´s to reduce overall processing time and to enable parallel scanning and processing of the scan data (see figure above);
- Selection of SSN from a list of "recruits of the day" instead of manually entering the SSN to reduce process time and increase process quality by avoiding incorrectly typed SSNs;
- Rearrangement of the recruit flow through the scanner by separating the scanner entry and scanner exit (thus crossing of the recruit flow will be avoided within the scanner room); and,

- Retraining and additional support for the operating personnel, providing additional material and posters for instruction of the recruits.

3.4.5 Recruit Size Selection File

The predicted sizes of a scanned recruit are recorded in an .sff file, which forms the interface to the further processing of the recruits body measurement and uniform items data. An example of an .sff file and the structure of the file are illustrated in the following figure that illustrates the structure of the recruit's "Size Selection" file.

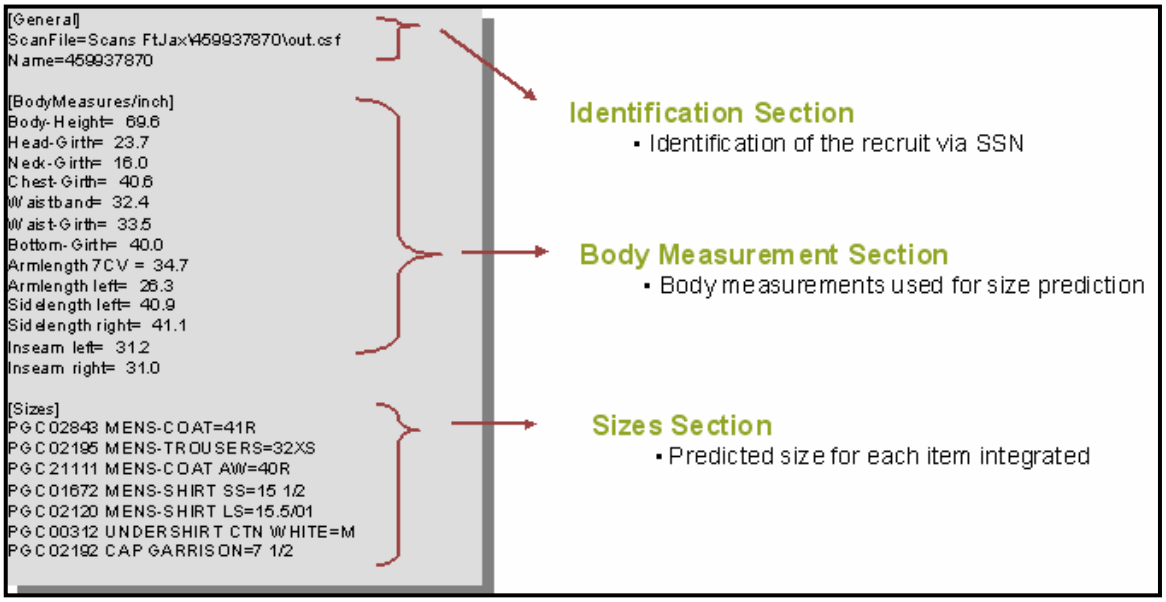


Figure 11: Structure of the Recruit's "Size Selection" File

3.4.6 Development and Use of Merlin Application

AdvanTech, following development of requirements definitions, created the Merlin application that looks for folders (with names matching the SSN of the recruit scanned) with a Human Solutions output file. After getting a list of new files, the Merlin application reads the files, extracts PGC numbers with their suggested sizes and creates a requisition for that recruit. The Merlin application loads a small set of alternate sizes based on a matrix indexed by the suggested size into the requisition and then prints the issue form. Additionally, Merlin stores the body measurements found in the output file by transferring the data to ARN-IRM. Additional information on the development of the Merlin application and the initial results achieved from the related research with this application are described in Section 4 of this report.

3.4.7 3D Whole Body Scanning Process

The following figure shows the integration of the initial data collection process into the existing issue workflow. The steps in the green box are the new ones.

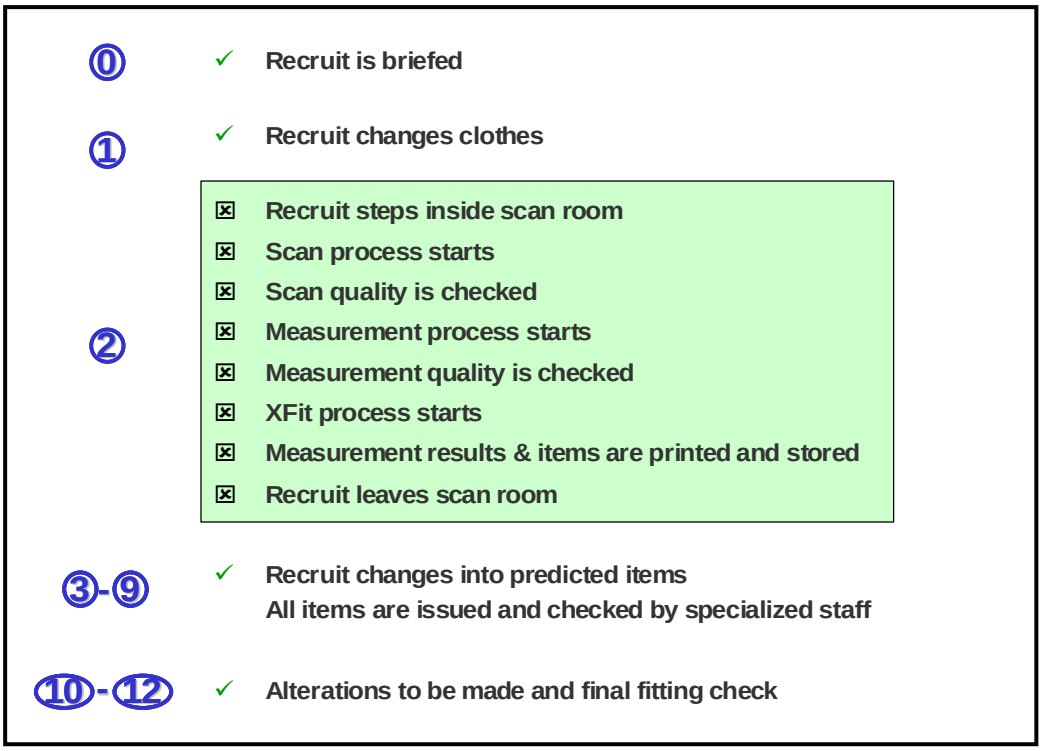


Figure 12: Ft. Jackson 3D Body Scanning Process for Initial Data Collection

3.4.8 Enhancements

3.4.8.1 Software & Process

On 2 April 2004, Human Solutions installed improved scanner software at Ft. Jackson to support improved process flow and simplified user interface. With the new version the process of scanning - measuring - fitting is simplified and requires only two clicks to control the complete process. Human Solutions finalized the development of a new version of scanning and size prediction software splitting processing to two PCs, distributing the processing for scanning on one PC and the measurement extraction and size prediction to the second PC in order to significantly improve recruit throughput.

Human Solutions developed a software component (called SWX WatchDog), which synchronizes the scanning on PC1 and the data processing on PC2. As soon as a new scan is available on the scanner PC, the body measurement extraction and size prediction software is started on PC2 to process the new scan.

AdvanTech produced a software application that merges data extracted from the Human Solutions 3D Whole Body Scanner into the IRM Control Panel database due to the absence of a recruit shipping plan or other list that would show the recruits and their Social Security numbers. This software module generates a requisition for those individuals scanned and prints the appropriate issue form. Human Solutions designed an additional software module allowing the operator to select the recruit from these daily

lists. Human Solutions finalized development of this software for entry of SSN based on list of daily recruits to significantly reduce SSN-input time.

AdvanTech integrated the functionality into its Merlin software (see Section 4) to provide a list of recruits projected for the current day by using the Julian date to create virtual platoon numbers. The list is exported by the Merlin software and imported to the SSN selection software on the scanner PC. Human Solutions installed in week 22 (5/24/04. – 5/28/04) the new software for SSN selection and split processing of the scan data. The software was installed via the VNC online connection line. With the new version the process of scanning - measuring - fitting could be further significantly simplified. The turn around time could be reduced to about 45 seconds to a minute, i.e. nearly double the throughput.

AdvanTech also analyzed the output from the Human Solutions software and created an application that searches for the correct folder based on the year and the week (which is how Human Solutions stores their data). This application then looks for folders (with names matching the SSN of the recruit scanned) with a Human Solutions output file. After getting a list of new files, the application reads the files, extracts PGC numbers with their suggested sizes and creates a requisition for that recruit. The application loads a small set of alternate sizes based on a matrix indexed by the suggested size, into the requisition and then prints the issue form. Additionally, the application stores the body measurements found in the output file.

Human Solutions and AdvanTech developed and implemented improvements in Scanner to ARN-IRM timing by modifying the flow of recruits and generally enhancing the process from the recruit scanning to printing of the recruits' issue scan forms. The recruit flow through the scanner was rearranged by separating the scanner entry and scanner exit (thus crossing of the recruit flow is avoided within the scanner room).

Human Solutions and AdvanTech worked on additional actions to improve process and appearance at Fort Jackson, and improved scanner throughput to one recruit each 0.75 to 1 minute. The main actions were:

- Splitting the scanning control software and scan data processing software to separate PC´s to reduce overall processing time and to enable parallel scanning and processing of the scan data;
- Selection of SSN from a list of "recruits of the day" instead of manually entering the SSN to reduce process time and increase process quality by avoiding incorrectly typed SSNs;
- Rearrangement of the recruit flow through the scanner by separating the scanner entry and scanner exit (thus crossing of the recruit flow will be avoided within the scanner room);
- Enhancement of the appearance by acquiring new furniture and a new scanner enclosure and redecoration of the scanner room;

- Retraining and additional support for the operating personnel, providing additional material and posters for instruction of the recruits; and,
- Installation of a telephone in the room for use as a hotline telephone to call AdvanTech or Human Solutions for support.

3.4.9 Acceptance

AdvanTech, Inc. and Human Solutions continued to provide ongoing training to employees at Ft. Jackson RTC. On 2 August 2004, AdvanTech hired a Customer Services Engineer to provide on-going operational support and guidance on the integrated operation of ARN-IRM and the Scanner and to ensure that all recruits were scanned.

Since the fitting rates at Ft. Jackson did not achieve the expected results, Human Solution personnel inspected the process on 10 and 11 November 2004. A first observation of the fitting process indicated that the only stations where staff was referring to the fitting sheet were the trouser and AW coat stations. Even there, recommendations were often used as a guide, and the “first choice” would not always be tried. At other stations, the sheets were completely ignored, and only used to fill in what size was issued.

Discussion with the fitters revealed two things: for many items, especially the Short Sleeve and Long Sleeve dress shirts, the size recommendations produced up to 8 different size recommendations, which looked confusing to them; also, the recommended sizes were often wrong in their opinion.

Discussions with the Supervisor at the CIIP were held to reinforce the use of the scan forms. Additional training was provided to the AdvanTech CSE in the benefits and motivations for using the scan forms. Finally, a brief discussion with fitters was held on Friday, 12 November 2004 in the morning to emphasize systems use and benefits to be achieved.

As a result of on-going observations, the personnel determined that the scan forms could be further optimized to make their use less confusing and more acceptable, especially regarding the long and short sleeve shirts. Samples of actual issued forms for the last several weeks were captured and sent to Human Solutions for analysis.

The size issue forms were also analyzed to verify that they were in agreement with the process philosophy that had been agreed upon. Additional training was provided by AdvanTech supported By Human Solutions and the management staff at the CIPP to the fitters in the importance of using the recommended sizes.

3.5 Pilot Process – Initial Data Collection

The pilot installation was the basis for the initial data collection in order to generate the size prediction tables and develop the size selection rules. Thus, the objective of this initial step was to collect information on body measurements and issued item sizes for a

sufficient number of recruits. From a statistical point of view approximately 20 data sets were necessary per size and per item to gain a significant correlation between body dimensions and predicted sizes. Therefore, the necessary number of recruits was approximately 1,500 due to the 71 different sizes of the Army green coat that has the largest number of sizes and was therefore the driver.

The figure below gives an overview of the issuing process, including the body-scanning steps (sequencing) for multiple recruits. All recruits perform steps 1 & 2 at the same time (briefing and changing). Subsequently, recruits approached each step one at a time.

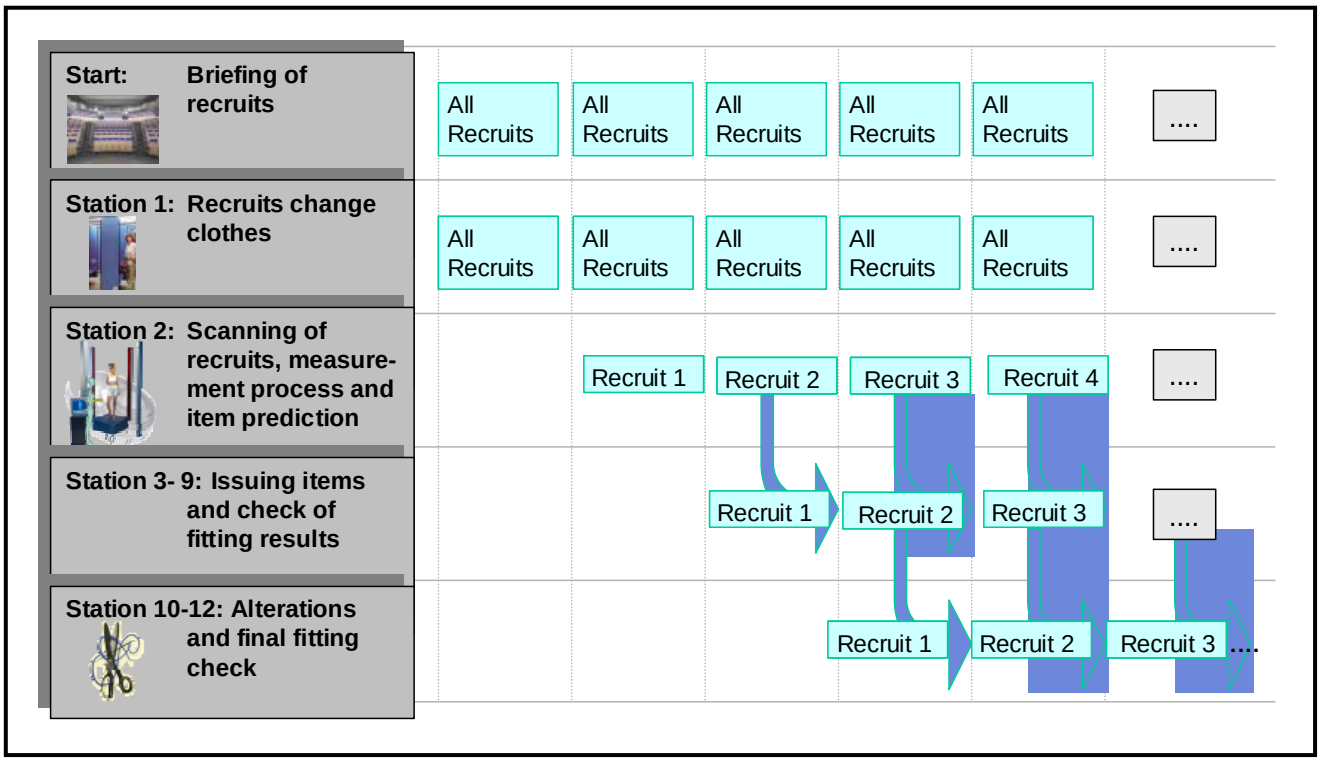


Figure 13: Ft. Jackson 3D Body Scanner Process

AdvanTech worked with Ft. Jackson supervisory personnel on modifying the recruit flow to allow for all recruits to be scanned prior to the issue. Ft. Jackson conducted the dress uniform issue in rather large batches of recruits. As many as 200 recruits arrived together around 0720 hours, and were briefed and then sent in batches of 40 to 60 to the stations on the issue line. The decision was made to decrease the size of the batches of recruits to about 10 in order to create more of a serial process. The first step of the process was changed to scanning the recruits to ensure all recruits could be scanned in the available time. Additional initiatives were considered to decrease the time required, i.e., better entry of the social security number (SSN) used to identify and track the individual recruit as the initial step in initiating the scanning process, and

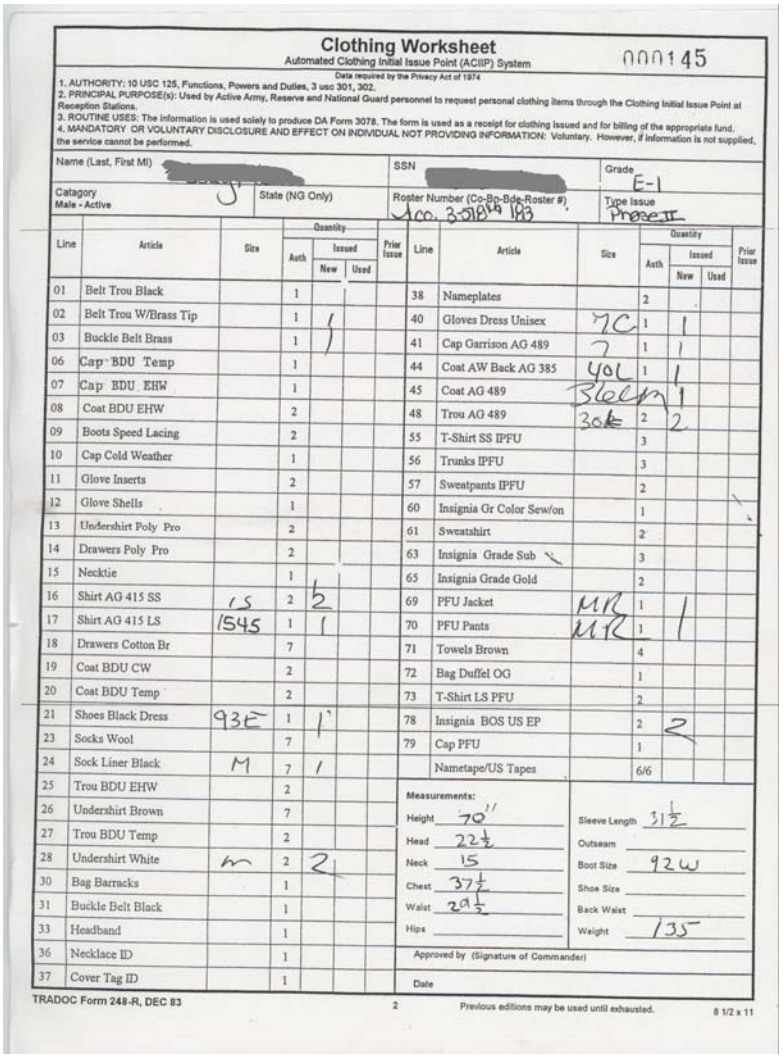
asking Human Solutions to modify ScanWorX to automatically delete the previous SSN from the entry screen when the user began to enter the next SSN.

The adjusted recruit flow, a more serialized process, added about 30 minutes to the entire Phase 2 Issue. With continued adjustment and practice the CIIP now scans all male recruits and completes the issues in less time than before. The employees on the issue lines have made every effort to accommodate changes to support the achievement of more efficient processes.

The initial data collection started in the middle of December 2004. Until the end of February 2005 the issue data and scans of approximately 600 male recruits were collected. AdvanTech and Human Solutions collaborated on the detailed format for data gathered by the scan system for transfer to the ARN-IRM system (exchange of data formats of body scans, body measurements and predicted sizes). The issued size data of each recruit was extracted from the clothing worksheets, transferred to a database and merged with the corresponding body measurement data from the 3D body scans for subsequent issues tracking and to provide for historical research on tariffs.

The initial data sampled in December 2003 was processed to validate systems operations. Every scan was checked with respect to scan quality and the recruit's posture. The body dimensions were also taken, documented and entered in a database.

All "Clothing Worksheets" (see following figure "Sample Clothing Worksheet at Ft. Jackson CIIP"), used to document the issued uniform sizes determined by staff were analyzed and entered in a database. These two databases were merged together into a common one that then could be used for further statistical analyses of the initial data collection.



Clothing Worksheet
Automated Clothing Initial Issue Point (ACIIP) System
000145

Data required by the Privacy Act of 1974
1. AUTHORITY: 10 USC 125, Functions, Powers and Duties, 3 usc 301, 302.
2. PRINCIPAL PURPOSE(s): Used by Active Army, Reserve and National Guard personnel to request personal clothing items through the Clothing Initial Issue Point at Reception Stations.
3. ROUTINE USES: The information is used solely to produce DA Form 3078. The form is used as a receipt for clothing issued and for billing of the appropriate fund.
4. MANDATORY OR VOLUNTARY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION: Voluntary. However, if information is not supplied, the service cannot be performed.

Name (Last, First MI) [redacted] SSN [redacted] Grade E-1
Catagory Male - Active J State (NG Only) Roster Number (Co-Bn-Bde-Roster #) Co. 3-51B4 103 Type Issue Phase II

Line	Article	Size	Quantity Auth	Issued New	Issued Used	Prior Issue
01	Belt Trou Black		1			
02	Belt Trou W/Brass Tip		1	1		
03	Buckle Belt Brass		1	1		
06	Cap BDU Temp		1			
07	Cap BDU EHW		1			
08	Coat BDU EHW		2			
09	Boots Speed Lacing		2			
10	Cap Cold Weather		1			
11	Glove Inserts		2			
12	Glove Shells		1			
13	Undershirt Poly Pro		2			
14	Drawers Poly Pro		2			
15	Necktie		1			
16	Shirt AG 415 SS	LS	2	2		
17	Shirt AG 415 LS	1545	1	1		
18	Drawers Cotton Br		7			
19	Coat BDU CW		2			
20	Coat BDU Temp		2			
21	Shoes Black Dress	93E	1	1		
23	Socks Wool		7			
24	Sock Liner Black	M	7	1		
25	Trou BDU EHW		2			
26	Undershirt Brown		7			
27	Trou BDU Temp		2			
28	Undershirt White	M	2	2		
30	Bag Barracks		1			
31	Buckle Belt Black		1			
33	Headband		1			
36	Necklace ID		1			
37	Cover Tag ID		1			

Line	Article	Size	Quantity Auth	Issued New	Issued Used	Prior Issue
38	Nameplates		2			
40	Gloves Dress Unisex	MC	1	1		
41	Cap Garrison AG 489	7	1	1		
44	Coat AW Back AG 385	40L	1	1		
45	Coat AG 489	36Long	1	1		
48	Trou AG 489	30L	2	2		
55	T-Shirt SS IPFU		3			
56	Trunks IPFU		3			
57	Sweatpants IPFU		2			
60	Insignia Gr Color Sew/on		1			
61	Sweatshirt		2			
63	Insignia Grade Sub		3			
65	Insignia Grade Gold		2			
69	PFU Jacket	MR	1			
70	PFU Pants	MR	1	1		
71	Towels Brown		4			
72	Bag Duffel OG		1			
73	T-Shirt LS PFU		2			
78	Insignia BOS US EP		2	2		
79	Cap PFU		1			
	Nametape/US Tapes		6/6			

Measurements:
Height 70" Head 22½ Neck 15 Chest 37½ Waist 29½ Hips
Sleeve Length 31½ Outseam Boot Size 9 2W Shoe Size Back Waist Weight 135

Approved by (Signature of Commander)
Date

TRADOC Form 248-R, DEC 83 2 Previous editions may be used until exhausted. 8 1/2 x 11

Figure 14: Sample Clothing Worksheet at Ft. Jackson CIIP

The results of the analyses showed that the hand postures and arm postures needed to be more consistent during the scan process. New tests were made and new instructions were issued to the scanning personnel at Ft. Jackson to improve scan quality.

Statistical analyses were made regarding the frequency distribution of the issued sizes in order to get an overview of the distribution of the different sizes and to get means to further control the scanning strategy in the ongoing process of the initial data collection. The analyses showed that for issues of the most frequent sizes a sufficient number of scans and size data were available. Additional recruit data was needed for the less frequent body types (e.g., short, tall, etc.). One unexpected effect was that for the

dress coat, the trouser and the all weather coat the most frequently issued sizes were "L" sizes and not "R" sizes.

3.6 Body Measurement Extraction

The next portion of the project focused on analyzing the data from this initial data collection period. Specifically, data was analyzed dealing with the time for each recruit to go through various elements of the entire fitting process. Further, a main focus was set on the comparison of automatic measurements from the scanner to manual measurements taken by an experienced tailor.

3.6.1 Scanning Posture

The prerequisite for reliable body measurements is the correct position and posture of the scanned person during the scanning process. The recruits were advised by the scanner operator and were also supported by a poster with visual information (see Appendix G – Scan Posture Poster).

The correct scanning posture was defined as follows and was checked by the scan operator prior to initiating the 3D scanning of the recruit:

1. The recruit must wear close fitting underwear (not boxer shorts).
2. The recruit stands on the scanner platform with his feet on "footprints" painted on the platform to indicate proper location. The footprints are positioned 20 centimeters (cm) apart at the feet. The recruit stands erect with the weight distributed equally on both feet.
3. The recruit forms fists with his hands and slightly bends his arms at the elbows and poses his hands approximately one hand width apart from his hips. The backs of the hands are turned in front direction.
4. The recruit turns his head in a straightforward position.
5. The recruit is to breath normally and takes a relaxed posture without flexing his muscles.

3.6.2 Automatic Body Measurement Extraction

The scans are analyzed with respect to a large set (approximately 80 different measurements) of body measurements. A list of body measurements for each recruit is generated on the second PC running the Human Solutions "ScanWorX Tailor" body measurement extraction software. The measurement extraction is a two-step process: (1) determination of landmarks, i.e., characteristic points on the body surface and (2) extraction of measurements by applying measurement rules on the landmarks. The result of the landmark extraction is illustrated in the following figure.

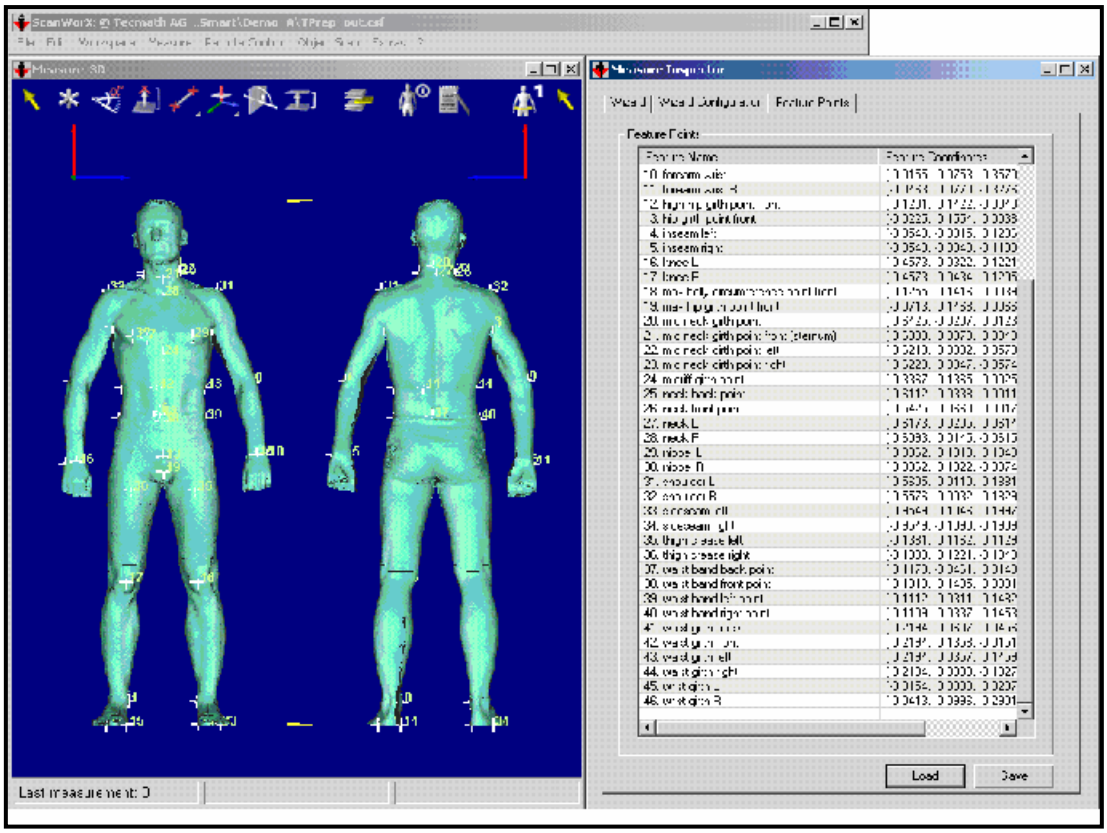


Figure 15: ScanWorX Tailor extraction of landmarks

A set of predefined body measurements is extracted based on the extracted landmarks. The body measurement rules are defined on base of the extracted landmarks and apply the measurement rule to the 3D scan geometry. The result of the body measurement extraction process is illustrated in the following figure.

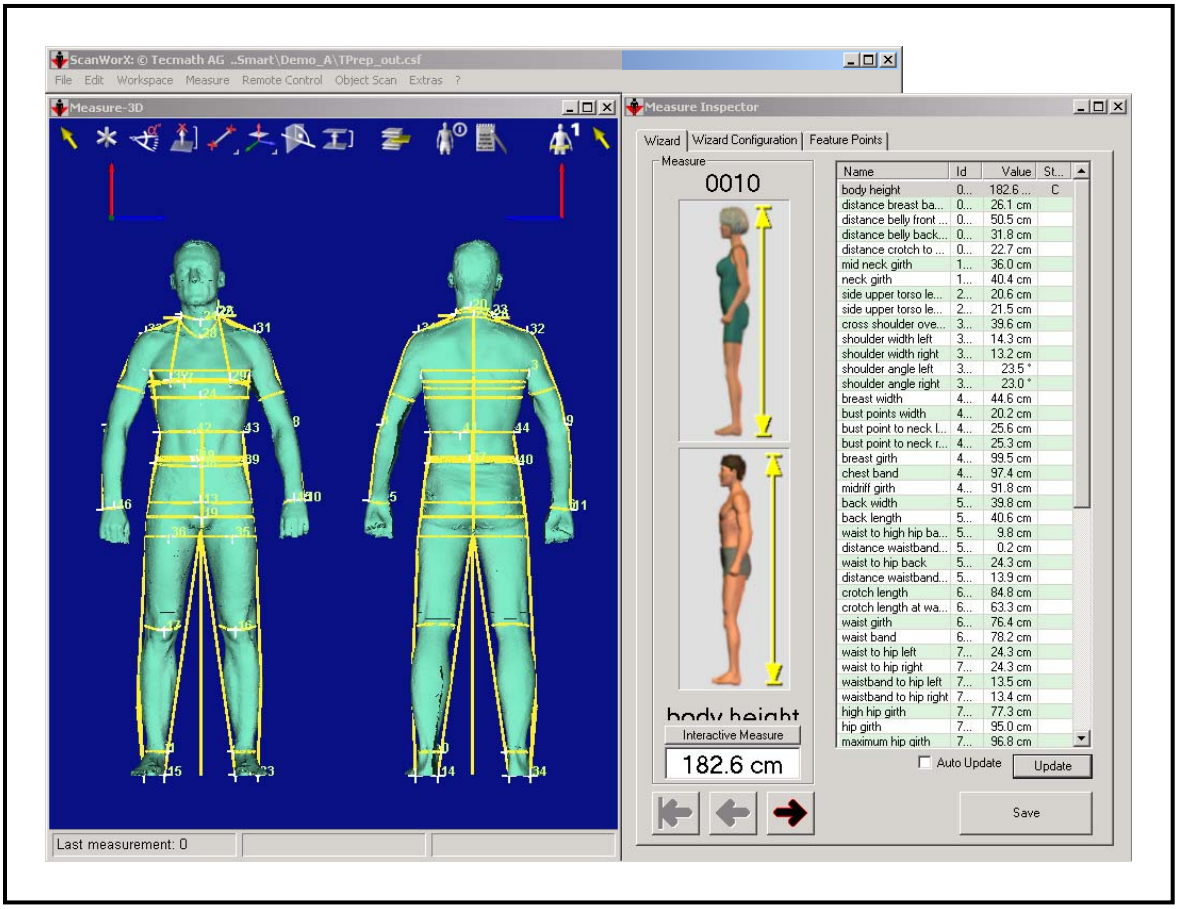


Figure 16: ScanWorX Tailor extraction of body measurements

The extracted body measurements for each recruit are saved in a body measurement file that is provided in the recruits scan folder for size prediction.

3.6.3 Body Measurements for Size Prediction

Body dimensions were identified that are the main driver for the size prediction. These are listed and explained in detail in Appendix D – Body Dimensions used for Size Selection.

3.6.4 Manual Measurement Comparison

A comparison to manually taken measurements was performed to validate the automatic body measurement extraction based on 3D scans. The comparison was made for both, (1) the Human Solutions scanner and automatic body measurement at Ft. Jackson, and (2) the Cyberware WBX scanner and measurement software installed at the MCRD Parris Island.

AdvanTech compiled preliminary data comparing the body measurements being generated by the 3D Body Scanner against the manual measurements taken by an experienced tailor at Fort Jackson. There were approximately 310 manual measurements. These measurements were then entered into a database and

compared with the electronic body measurements that were extracted from the VITUS/Smart scanner. AdvanTech and Human Solutions agreed on a number of basic measurements that are relevant for both Electronic Order Form and size selection. The following measurements were defined for the manual measurement comparison: body height, neck circumference, chest circumference, waist circumference, arm length from neck, and out-seam.

The set of selected measurements for the comparison and the corresponding measurements from the EOF (Electronic Order Form) measurement definitions are illustrated in the following figure:

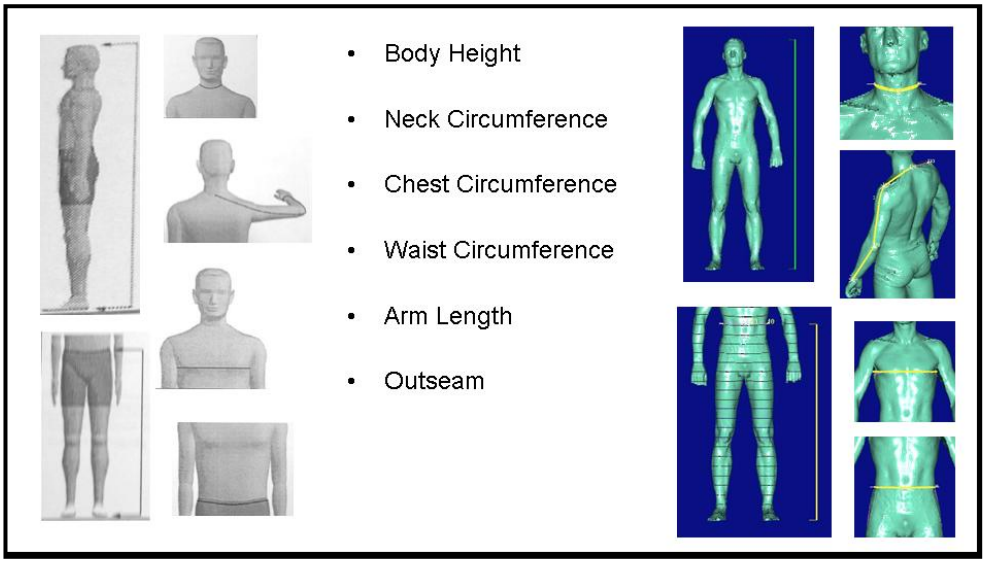


Figure 17: Selection of Measurements for Manual Measurement Comparison

AdvanTech and Human Solutions analyzed these measurements with scan measurements from Fort Jackson and Parris Island. The following table shows the result of the comparison:

Table 4: Deviations between tailor measurements and scanner measurements

	Average Variance in Inches (Scan Measurement – Manual Measurement)	
	Ft. Jackson	**Parris Island**
Height	(0.71)	(1.36)
Neck	(0.54)	(0.80)
Chest	0.46	(0.64)
Waist	0.79	(0.80)
Arm Length	1.87	1.99
Outseam	(1.36)	N/A

In order to check the consistency of the body measurements with the issued sizes at Ft. Jackson, Human Solutions compared the primary measurements with the referencing size designation (e.g., the chest circumference for the chest size of the dress coat). The result is shown in the following chart:

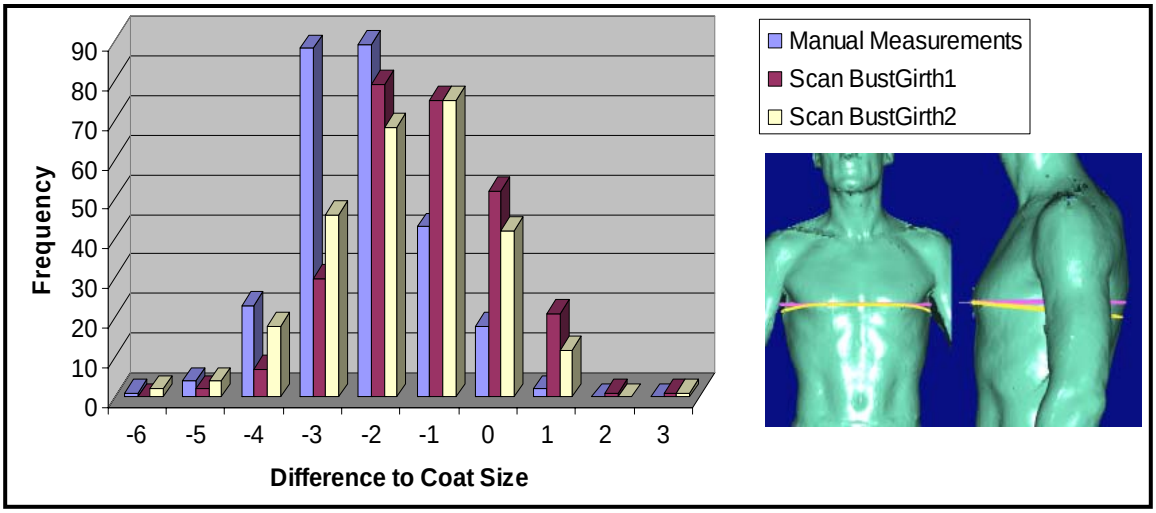


Figure 18: Comparison chest measurements

The chart shows, that the chest girth taken by the Human Solutions scanner is more consistent to the issued size of the dress coat than the manual measurement.

The results of study are summarized as follows:

- Deviations of average differences between manual and scanner measurements occurred over time (i.e., the tailors seemed to slightly change the measurement method over time, or the operator changed his process slightly).
- Manual and scanner measurements showed comparable deviations to reference body dimensions of size (i.e., issued items are not completely consistent with either manual or scanner measurements).
- Systematic deviations between Manual and Scanner Measurements have almost no influence on the issued sizes.

The results of the study were directly incorporated into the size selection rule definition by means of the Human Solutions Size Prediction approach. This ensures that the size prediction process is adapted to the characteristics of the body measurement process itself since the rules are defined on basis of the observed distribution of the body measurement value within each of the sizes.

3.7 Automatic Uniform Size Selection

A separate but crucial element in the project was the inclusion of the U. S. Army's philosophy on measurement and fit for dress uniforms. This understanding was necessary so that the proper body measurement and size selection algorithms could be developed into the software to accurately extract body measurements according to the U.S. Army's fitting standards.

3.7.1 Size Selection Process

The size selection prediction process is illustrated in the following figure. This figure provides a visualization of the hardware and software components and the flow of information from 3D scanning of the soldier to the determination list of selected sizes to be issued to the recruit. The sequence of steps for processing as illustrated in the figure includes the following:

1. The 3D body scanning of the soldiers to capture the complete body surface of the soldier with the 3D full body scanner VITUS/Smart is completed as a first step. The primary soldier data from the 3D scan is compared to a small set of one dimensional conventional body dimensions
2. Automatic body measurement extraction is completed from the extraction of appropriate body dimensions from the 3D scans of the soldiers, allowing the system software to automatically extract a large number of body dimensions according to defined measurement rules.

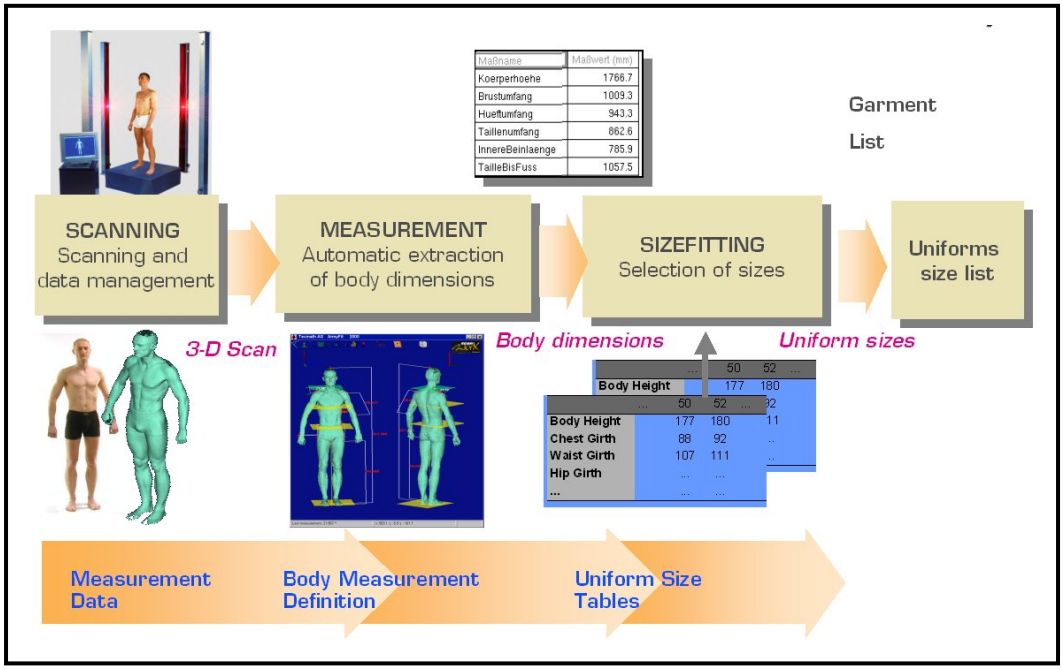


Figure 19: Garment Size Selection Process

3. The Automatic Size Selection is based on extracted body measurements and item specific size selection rules and algorithms that are based on the results of statistical analysis of empirically sampled size selection data the best fitting garment size is predicted.

3.7.2 Size Selection Methodology

A crucial point for garment size selection is based on the availability of appropriate and sufficient size-body-relation information and appropriate size selection rules and size prediction algorithms. Further size selection rules and algorithms strongly depend on the type of uniform, the functional requirement and garment patterns used for the manufacturing.

The “best fit size” is that size which fits best to an individual subject. This definition comprises both: fit according to predefined standards and regulations following an objectified “notion of fit;” and fit according to the individual feeling of the individual that is strongly influenced by subjective criteria of fit. Relating and comparing individual body measurements with corresponding measurements of the garment item sizes typically can describe both definitions.

Information in garments size tables typically only relates primary body measurements like body height, chest girth, waist girth etc. with a certain item size. This is by far not sufficient for reliable size selection algorithms, since the “best size” selection is influenced by a number of factors including the following:

- **Designer intentions:** The intended "look and feel" has to be addressed when a best-fit size is selected. For example, a pair of jeans has a different look and feel than the pants from a business suit, and an Army soldier's uniform fits differently than a Marine or Navy uniform.
- **Postural influences:** Two subjects may have nominally identical body dimensions but one may have a normal posture, whereas the second may have a rounded back. Both subjects may not fit into the same garment size. Thus, incorporation of postural information is necessary.
- **Individual Preferences:** Additionally, fit often is based on subjective criteria or experience of the fitter. As results from other projects show, two different fitters may prefer two different sizes for the same soldier, thus there are two different "notions of fit", even if the regulations are the same. To the extent possible, the fit of uniforms should be based on the established regulations and exclude the subjective influences of the fitters.
- **Objectiveness of size fitting:** Size fitting may follow different goals (e.g., highest satisfaction of the customer or objectified notion of fit vs. least amount of modification by the manufacturer), but for some applications it may make sense to focus only on certain fitting criteria. Thus, if modifications to predefined garment sizes are necessary; sizes should be selected that minimizes the effort and work for the modification. For example, it is simpler to shorten the sleeve lengths than to widen the chest and waist of a jacket.
- **Manufacturer specific "interpretation" of sizes:** Most garment manufacturers use standardized garment size charts. Since only a few basic body dimensions often describe these charts, manufacturers are free to vary the final garment size within a certain range.

3.7.3 Size selection algorithm development

In order to develop and optimize item specific size prediction algorithms and reliable selection rules it is necessary to analyze correlations between large numbers of body measurements and the best fitting or issued (according to specific "fit philosophy") garment item size of a large number of samples. The size selection methodology and development of the algorithms is based on the following steps:

(1) Initial Set-up of the size selection rules and algorithms based on body dimensions or use of predefined size tables available from the existing size table information available in the Technical Specifications and/or Fit Manuals and integration into the ScanWorX size prediction software.

(2) Data collection (scan, body measurements, size selection) and fit assessment for the statistical analysis and characterization of each item

size. A sufficient number of subjects for each item size haves to be scanned to gain statistically valid results for each item size.

(3) Statistical analysis of the size selection philosophy and adjustment of size selection rules based on data collection results (identification of discriminating body dimensions, distribution parameters of each body measurement within each size, dependencies between body measurements, etc.).

(4) Optimization of the size selection configuration the size selection software according to the results of the data analysis.

(5) Validation of size selection where automatically predicted sizes are fitted and compared to the sizes issued.

The overall process of generating appropriate garment size selection algorithms and adapting the size selection rules for generating the automatic size selection is shown in the following figure.

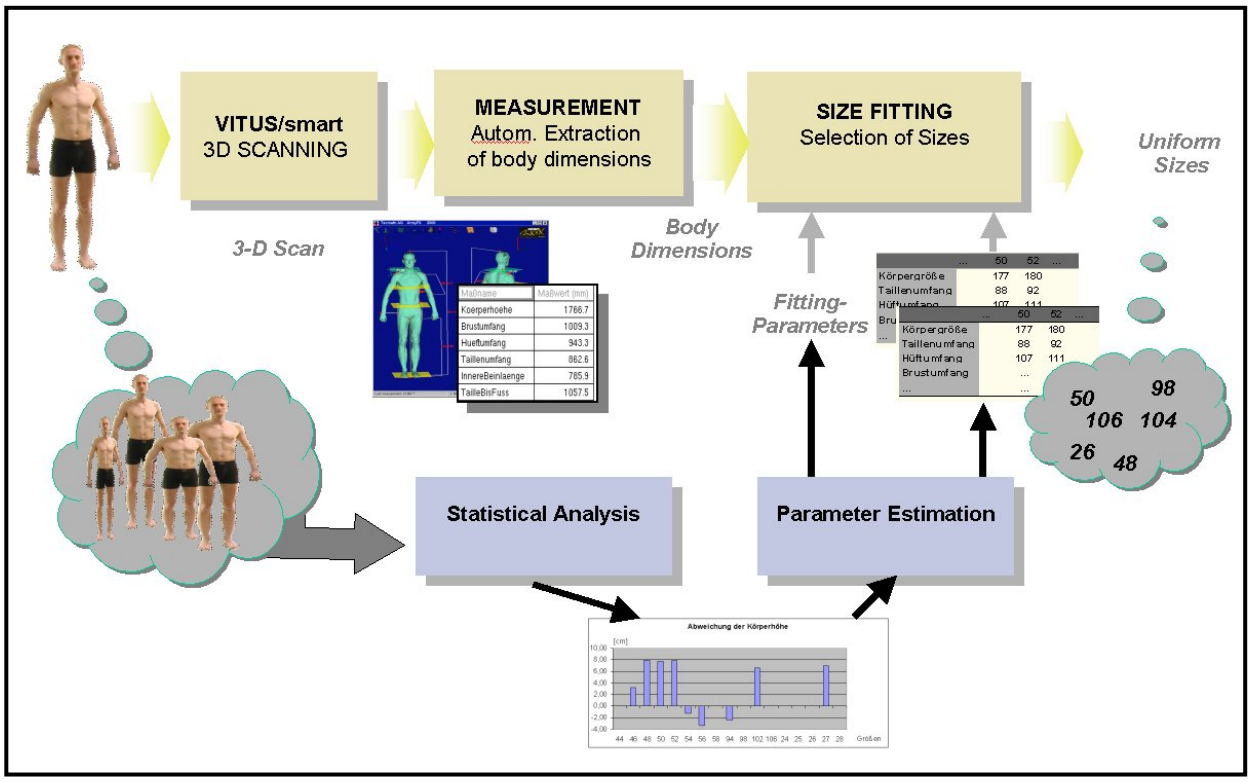


Figure 20: Development and Optimization of Size Selection Rules and Algorithms

Development and optimization of size selection rules and algorithms is an iterative process. Thus, the previous described step (2) to step (5) are performed in a loop.

3.7.4 Uniform Item and Size Table Definition for Automatic Size Prediction

The work and elaboration was based on the size table information from existing Technical Manuals (TM 10-227), detail information from garment specifications (e.g., available commercial item descriptions) for Army male uniform garment items.

The following table indicates the uniform items that were included into the automatic size issuing process. For these items size tables and size selection rules are partially available from Army Fit Manual (TM 10-227). This information was researched for development of appropriate size selection tables for automatic size prediction. This information was completed and validated during the initial sites and base lining activities.

Table 5: Sizing Systems and number of Size of the Male Uniform Items selected for Automatic Size Prediction

PGC	Item	# sizes	# length	total # items	Gender	Mil Spec
PGC 02843	Men's Coat	19	1-5	71	m	MIL-C-44211
PGC 02195	Men's Trousers	18	1-5	55	m	MIL-T-43957
PGC 21111	Men's All Weather Coat	10	2-5	30	m	A-A-55260
PGC 02120	Men's Long Sleeve Shirt	11	1-5	37	m	A-A-52112
PGC 01672	Men's Short Sleeve Shirt	12	na	12	m	A-A-52112
PGC 00312	Men's Undershirt	8	na	8	m	A-A-50013
PGC 02192	Men's Caps (Garrison)	13	na	13	m	MIL-C-43419

The main sources for size table information were technical documentation and descriptions of the items available in the TM 10-227 (Army Technical Manual for Fitting Uniforms), Technical Specifications Documents (downloaded from the ASSIST web site) and information provided in the Warfighter Queries web pages (http://ct.dscp.dla.mil/Catalog/pgcs).

The US Army Uniform Items have been analyzed with respect to the following criteria:

- Structure of the size system and number of sizes;
- Specification of the size by Body Measurements (BM) and Finished Measurements (FM); and,
- Merging of specifying information from Technical Manual and Item specification document.

The results of the analysis are illustrated and summarized in the table following (see “Sizing Systems number of Sizes and measurements of the Male Uniform Items

selected for Automatic Size Prediction") showing the identified type of sizing system (1-dimension or 2-dimensional), the number of sizes of the item as well as the body measurement and final measurement information.

Table 6: Sizing Systems number of Sizes and measurements of the Male Uniform Items selected for Automatic Size Prediction

Item	sizes	# sizes	length	# length	total # items	BM = Body Measures (TM); FM = Finished Measurements (ASSIST); na = not available				
Men's Coat	30 - 52	19	XS - XL	1-5	71	Body Height	Chest	Breast	Sleeve Length	Back Length
						BM	BM	FM	FM	FM
Men's Trousers	26-46	18	XS - XL	1-5	55	Body Height	Waist	Seat	Inseam	Outseam
						BM	BM	BM	FM	FM
Men's All Weather Coat	34 - 52	10	XS - XL	2-5	30	Body Height	Chest	Back Length	Sleeve Length	Belt Length
						BM	BM	FM	FM	FM
Men's Long Sleeve Shirt	13 1/2 - 19	11	29 - 37	1-5	37	Neck Size	Sleeve length	Chest	Back Length	
						BM	BM	FM	FM	
Men's Short Sleeve Shirt	13 1/2 -19	12	na	na	12	Neck Size				
						BM				
Men's Undershirt	XXS - XXL	8	na	na	8	Chest				
						BM				
Men's Caps (Garrison)	6 3/8 - 7 7/8	13	na	na	13	Head Size				
						BM				

The above table indicates that for each item at least one body measurement (BM) is specified in the Technical Specification Documents or in the Army Fit Manual. For the items based on two-dimensional size systems like the men's coat or the men's trousers at least two specified body measurements could be identified. Additionally finished measurements (FM) are available for the first four items, but the relationship to body measurements is unspecified.

Based on the above initial size selection tables have been extracted and developed, which form the base for integration into the Size Prediction Software. In the following table the initial size selection table for the men's trousers is shown as an example:

Table 7: Initial Size Selection Table for Men's Trousers

Size-Table Men's Trousers			BM Body Height (in		BM Waist (inch)		BM Seat (inch)		FM Inseam (inch)		FM Outseam (inch)	
			From ≥	to <	From ≥	to <	From ≥	to <	From ≥	to <	From ≥	to <
26 XS	(*P)	26XS(*P)	60	65	26	27	34	35	30	32	37 5/8	40 1/8
26 S	(P)	26S(P)	65	68	26	27	34	35	32	34	40 1/8	42 5/8
26 R	1	26R	68	71	26	27	34	35	34	36	42 5/8	45 1/8
26 L	(*P)	26L(*P)	71	74	26	27	34	35	36	38	45 1/8	47 5/8
27 R	1	27R	68	71	27	28	35	36	34	36	42 3/4	45 1/4
27 L	(P)	27L(P)	71	74	27	28	35	36	36	38	45 1/4	47 3/4
28 XS	(*)	28XS(*)	60	65	28	29	36	37	30	32	37 7/8	40 3/8
28 S	1	28S	65	68	28	29	36	37	32	34	40 3/8	42 7/8
28 R	1	28R	68	71	28	29	36	37	34	36	42 7/8	45 3/8
28 L	1	28L	71	74	28	29	36	37	36	38	45 3/8	47 7/8
28 XL	(*)	28XL(*)	74	77	28	29	36	37	38	40	47 7/8	50 3/8
29 S	1	29S	65	68	29	30	37	38	32	34	40 1/2	43
29 R	1	29R	68	71	29	30	37	38	34	36	43	45 1/2
29 L	1	29L	71	74	29	30	37	38	36	38	45 1/2	48
29 XL	(*)	29XL(*)	74	77	29	30	37	38	38	40	48	50 1/2
.	.	.	.	.	.	.	.	.	.	.	.	.
41 R	(P)	41R(P)	68	71	41	42	49	50	34	36	44 1/2	47
41 L	1	41L	71	74	41	42	49	50	36	38	47	49 1/2
42 R	(P)	42R(P)	68	71	42	43	50	51	34	36	44 5/8	47 1/8
42 L	1	42L	71	74	42	43	50	51	36	38	47 1/8	49 5/8
43 R	1	43R	68	71	43	44	51	52	34	36	44 3/4	47 1/4
43 L	1	43L	71	74	43	44	51	52	36	38	47 1/4	49 3/4
44 R	1	44R	68	71	44	45	52	53	34	36	44 7/8	47 3/8
44 L	1	44L	71	74	44	45	52	53	36	38	47 3/8	49 7/8

The results of the initial size selection tables was presented and discussed at a workshop organized by the Program Manager on November 13, 2003 in Waltham, MA.

In the process of configuration the sizing codes available from different sources turned out to be inconsistent and had to be homogenized for the further linking to ARN-IRM. The names of the items and the notation of the sizes turned out to be different and varying depending on the source of information. For example the fitters at Ft. Jackson use a different notation compared to the Technical Specification. These, in turn were sometimes different from the notation in the Fit Manual or from the Warfighter Catalog.

Example: MAN´s SHIRT Long Sleeve, PGC 02120. The following different size codings were found for a 16-inch neck and 32-inch sleeve length shirt:

- 16X 32/33 from Warfighter Catalog
- 16/23 from the recruit item sheet at Ft. Jackson
- 16 x 32 from ARN-System
- 16 32/33 from Technical Specification
- no complete code from FitManual

To remedy the differences, AdvanTech and Human Solutions agreed to use the PGC to identify the item. The PGC is part of the information generated in the result of the size

selection and thus uniquely identifies the item. The name of the item is additionally available and the size coding of the items is as specified in the Warfighter Catalog (http://ct.dscp.dla.mil/Catalog).

3.7.5 Initial Size Prediction Evaluation

In order to check the validity and plausibility of the item size information with respect to items issued in the initial data collection phase, the initial size selection tables based on the specified body measurements were integrated into the Human Solutions size prediction software. The results of the initial size selection configuration exclusively based on the information provided by the Technical Specifications and the Fit Manual are illustrated in the following diagram.

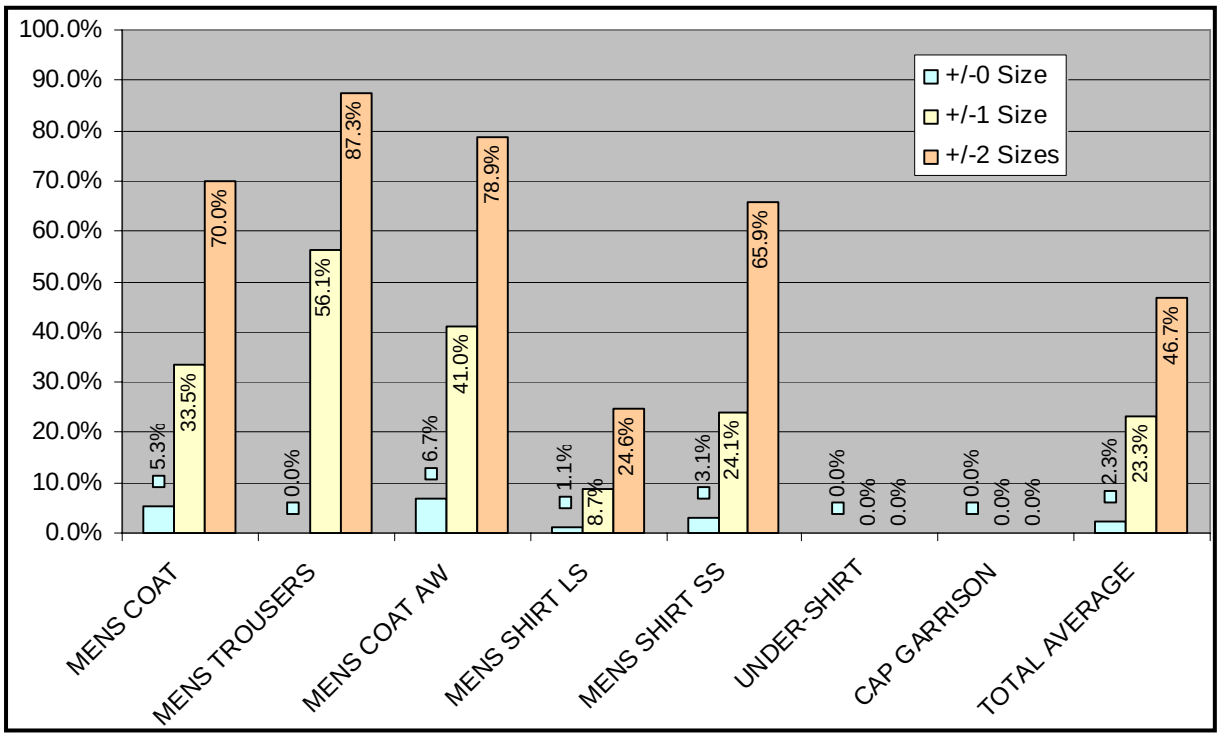


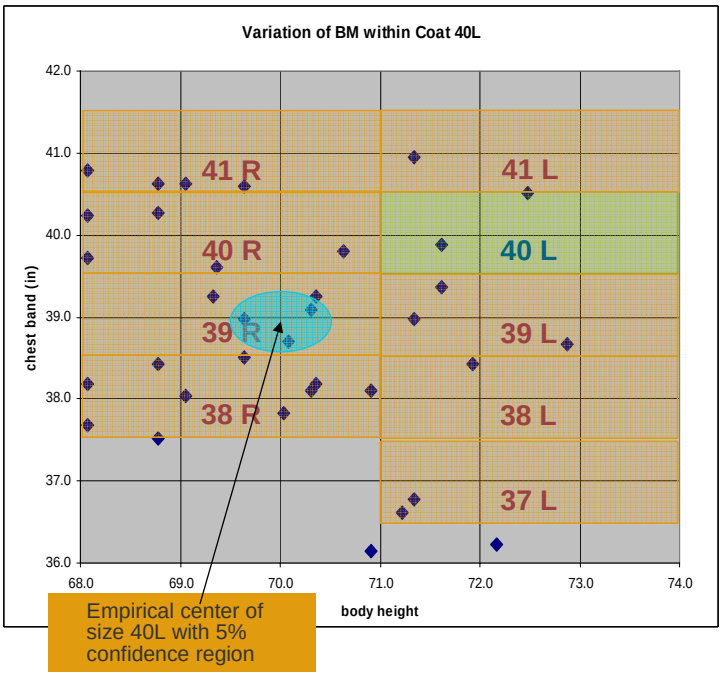
Figure 21: Evaluation of the fitting rates based on Technical Specification Size Tables

In order to analyze the fitting rates the concept of "+/-1" and "+/-2" sizes beneath exact hits was introduced. The "+/-1" size is defined by all directly neighbored sizes within the size system of the item. For Example, a "40L" or a "39R" is within the "+/-1"-range of a "40R" of the Men's Coat; a "39L" is within the "+/-2"-range of the "40R." This is shown in the following figure (See "Definition of the metrics for "+/-1" and "+/-2" sizes).

-1 / +1	+ 1	+1 / +1
- 1	0	+ 1
-1 / -1	- 1	+1 / -1

Figure 22: Definition of the metrics for "+/-1" and "+/-2" sizes

The predicted sizes have been evaluated on base of the recruit body measurement information gained from the initial data collection. The predicted sizes and the issued sizes were compared and analyzed. The results illustrated for a specific item size "40L" of the Men's Coat are illustrated in the following figure and summarized in the comments following the figure.



- Recruits with Coat 40L strongly vary in the basic body measurements
- Recruits with Coat 40L nominally cover a large set of different sizes
- The nominal 40L recruits are not centred

MENS COAT	body height (in)	chest band (in)
N	35	35
Min	68.1	36.1
Max	72.9	40.9
Range	4.8	4.8
Average	70.1	38.9
StdDev	1.4	1.3
5% confiden	0.5	0.4

Figure 23: Variation of body measurements within issued size (specifically size "40L" of Men's Dress Uniform Coat)

1. Each item showed within each body measurement large variations within the sizes. The ranges of body measurements within one size were a multiple larger than the grading step between one and the next size.
2. The distribution of the body measurements around the specified reference values of a size is not symmetrical, i.e., there are systematic deviations between the nominal size values and the measurements of the recruits.

For illustration of the above effect observed and discussed for the “40L” the average values and the difference to the nominal values of all Men’s Coat size has been calculated and tabulated in the following figure.

COAT AG 489

Average chest band (in)		COAT AG 489 - Length XS	SM	RM	LM	XLM	Total
COAT AG 489 - Chest	n.a.	38.5					38.5
	35			33.8		36.5	34.5
	36		35.9	34.7	35.5		35.3
	37		33.9	35.9	35.3		35.7
	38		37.2	37.3	36.9	38.0	37.1
	39		38.7	38.3	38.1	37.3	38.1
	40		39.8	38.8	38.9	38.4	38.8
	41			40.5	40.5		40.5
	42		41.0	41.5	41.7	41.5	41.6
	43			42.9	42.5	43.0	42.6
	44			43.4	43.7	43.1	43.4
	46			48.3	45.6	47.6	46.1
	48			44.5			44.5
Total		**38.5**	**38.4**	**38.6**	**39.6**	**40.5**	**39.3**

COAT AG 489

Delta		COAT AG 489 - Length XS	SM	RM	LM	XLM	Total
chest band (in)		63 1/2	66 1/2	69 1/2	72 1/2	75 1/2	
COAT AG 489 - Chest	n.a.						
	35			-1.2		1.5	**0.2**
	36		-0.1	-1.3	-0.5		**-0.6**
	37		-3.1	-1.1	-1.7		**-2.0**
	38		-0.8	-0.7	-1.1	0.0	**-0.7**
	39		-0.3	-0.7	-0.9	-1.7	**-0.9**
	40		-0.2	-1.2	-1.1	-1.6	**-1.0**
	41			-0.5	-0.5		**-0.5**
	42		-1.0	-0.5	-0.3	-0.5	**-0.6**
	43			-0.1	-0.5	0.0	**-0.2**
	44			-0.6	-0.3	-0.9	**-0.6**
	46			2.3	-0.4	1.6	**1.2**
	48			-3.5			**-3.5**
Total			**-0.9**	**-0.8**	**-0.7**	**-0.2**	

Chest Girth

- Average chest girths calculated for all sizes for the mens coat
- Differences to the chest value provided in the Fit Manual and Technical Specification
- Difference values are basis to be integrated into size selection tables

less	more	than
15	15	Samples

Figure 24: Variation of body measurements within issued size (specifically size “40L” of Men’s Dress Uniform Coat)

3.7.6 Refinement of the Size Selection Rules

The refinement of the size selection rules and the development of the size prediction configuration were based in a first step on issue and body measurement data of approximately 2,500 recruits scanned through March 2004. A systematic statistical analysis of the distribution of the observed body measurements was performed and for each of the items a set of significant body measurements influencing the size selection was identified. These are illustrated in the following table.

Table 8: Body Measurements used for size selection

	Body Height	Head Girth	Neck Girth	Chest Girth	Waist Girth	Waist Band	Arm Length (7. CV)	Bottom Girth	Side Length	Crotch Height
Men's Coat	X			X	X		X	X		
Men's Trousers					X	X		X	X	X
Men's All Weather Coat	X			X	X		X	X		
Men's Long Sleeve Shirt	X		X	X	X		X			
Men's Short Sleeve Shirt	X		X	X	X					
Men's Undershirt				X						
Men's Caps (Garrison)		X								

Basic structural information from the size tables and the results of the statistical analysis were merged into the setup of the size selection configuration.

The following figure shows the results of the fit rate evaluation based on the 2,500 recruit sample from November 2003 to end of March 2004. The scans available until end of March 2004 and the available information about the issued size was compared with the predicted sizes. The results were presented in detail at the review meeting in McLean on April 21, 2004. The following is a summary of the results analyzed for exact matches, +/-1 size matches and +/-2 sizes matches.

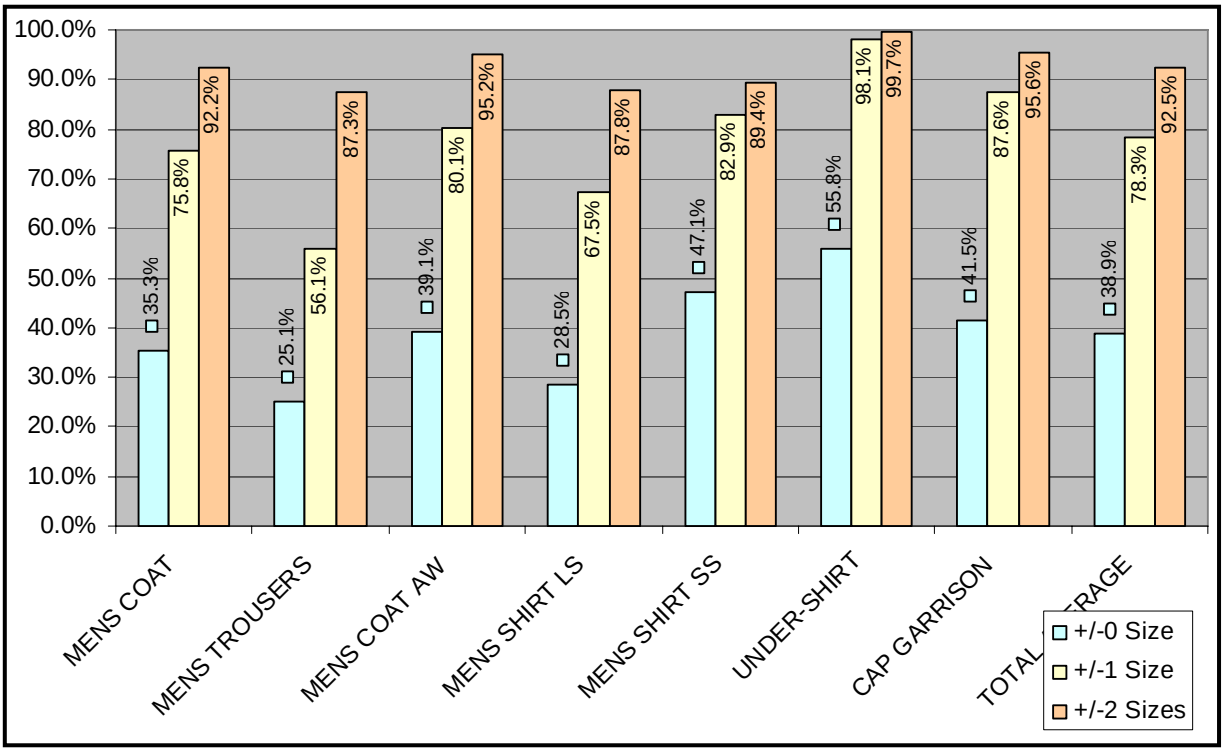


Figure 25: Evaluation of the fitting rates based on Technical Specification Size Tables merged with observed issued of 2500 recruits

3.7.7 Optimization of the size prediction configuration

The refinement of the size selection rules and the optimization of the size prediction configuration were predicated on the basis of the data gained during the period of April 2004 to June 2004.

The available data for issued sizes and the body measurements were analyzed with regard to the body measurement distribution within each of the sizes of the items. For the optimization of the size prediction configuration, the parameters for specifying the range and the weights of the body measurements have been adjusted.

Table 9: Example of Statistical Analysis of Body Measurements for the Army Dress Coat

STATISTICAL SIZE ANALYSIS

Confidence-A 5%

Coat c1	Coat c2		Body height (in)	Head circumference (in)	Mid neck girth (in)	Bust/chest girth (in)	Bust/chest girth (horizontal) (in)	Across back width (armpit level) (in)	Arm length to neck back left (in)	Arm length to neck back right (in)	Arm length left (in)	Waist girth (in)	Waist band (in)	Buttock girth (in)	Inseam left (in)	Inseam right (in)	Sideseam at waist left (in)	Sideseam at waist right (in)
		Total Cases	8213	8213	8213	8213	8213	8213	8213	8213	8213	8213	8213	8213	8213	8213	8213	8213
39	XS	**Number**	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
39	XS	**Mean**	61.9	22.1	14.8	37.7	38.2	14.9	29.6	29.9	21.6	31.4	30.8	37.3	26.9	26.9	39.0	39.0
39	XS	**Min**	60.5	21.5	14.1	36.8	36.8	13.2	28.5	29.0	20.2	29.5	28.1	34.9	25.3	25.4	37.7	37.7
39	XS	**Max**	65.2	22.7	15.5	38.5	39.0	16.6	30.3	30.9	22.5	33.7	33.3	38.8	28.5	28.4	40.2	40.1
39	XS	**StdDev**	1.6	0.5	0.5	0.9	0.7	1.2	0.6	0.6	0.8	1.4	1.8	1.4	1.2	1.2	1.2	1.1
39	XS	**ConfidenzInterval**	1.2	0.3	0.3	0.6	0.5	0.9	0.4	0.5	0.6	1.0	1.3	1.0	0.9	0.9	0.9	0.8
39	S	**Number**	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123
39	S	**Mean**	64.4	22.4	15.0	37.9	38.3	15.5	31.0	31.1	23.0	31.4	31.5	38.0	28.4	28.4	40.6	40.6
39	S	**Min**	61.5	10.7	13.6	33.6	35.5	13.6	28.8	28.8	21.0	28.5	28.2	35.5	25.0	24.9	38.2	38.2
39	S	**Max**	66.5	24.7	16.4	41.1	40.9	18.2	33.6	33.4	25.3	35.0	34.4	40.6	30.7	30.7	43.0	43.0
39	S	**StdDev**	1.2	1.3	0.5	1.2	1.1	0.9	0.9	0.8	0.9	1.2	1.4	1.1	1.1	1.1	1.0	1.0
39	S	**ConfidenzInterval**	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
39	R	**Number**	493	493	493	493	493	493	493	493	493	493	493	493	493	493	493	493
39	R	**Mean**	67.2	22.6	15.0	38.4	38.8	15.8	32.2	32.3	24.1	31.8	32.2	38.8	29.9	29.9	42.6	42.6
39	R	**Min**	62.8	16.8	13.7	34.0	35.2	13.2	29.9	29.5	21.7	28.7	28.2	35.7	26.7	26.2	39.4	39.5
39	R	**Max**	70.1	24.4	16.5	44.0	44.2	18.8	34.5	34.6	26.6	37.2	40.1	48.4	33.8	33.5	45.6	45.6
39	R	**StdDev**	1.2	0.8	0.5	1.3	1.2	0.9	0.9	0.8	0.9	1.1	1.4	1.3	1.1	1.1	1.0	1.0
39	R	**ConfidenzInterval**	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
39	L	**Number**	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512
39	L	**Mean**	69.9	22.7	14.9	37.9	38.5	15.7	33.3	33.4	25.2	31.4	32.3	38.8	31.6	31.7	44.7	44.7
39	L	**Min**	65.9	16.6	13.6	32.1	32.8	12.9	29.6	29.4	21.0	27.6	28.7	34.3	25.7	25.7	41.0	40.9
39	L	**Max**	74.0	24.5	16.3	42.1	42.3	18.5	35.9	36.2	27.7	34.9	42.9	48.2	35.6	35.8	49.2	49.4
39	L	**StdDev**	1.2	0.7	0.5	1.3	1.2	1.0	0.9	0.9	0.9	1.1	1.4	1.2	1.2	1.2	1.1	1.1
39	L	**ConfidenzInterval**	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
39	XL	**Number**	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143
39	XL	**Mean**	73.0	22.9	14.8	37.8	38.4	15.9	34.7	34.8	26.5	31.0	32.5	39.0	33.8	33.8	47.1	47.2
39	XL	**Min**	70.1	12.1	13.4	33.0	34.6	13.0	32.3	32.9	24.3	28.3	29.3	35.7	30.7	30.7	44.2	44.4
39	XL	**Max**	76.3	24.9	16.4	41.4	41.6	18.2	37.0	37.4	28.5	33.7	35.4	42.2	37.9	38.1	50.1	51.3
39	XL	**StdDev**	1.2	1.1	0.5	1.4	1.3	1.0	0.9	0.9	0.9	1.1	1.3	1.2	1.2	1.2	1.1	1.1
39	XL	**ConfidenzInterval**	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2

The results for the size prediction in June 2004 are illustrated in the following.

Evaluation

Start Date 31.05.2004 End Da 30.06.2004 No. Selected Scans **838**

Configuration	Date			MENS COAT	MENS TROUSERS	MENS COAT AW	MENS SHIRT LS	MENS SHIRT SS	UNDER-SHIRT	CAP GARRISON	TOTAL AVERAGE
V1-04-08	9-June-2004	Cases	Fit	784	803	807	783	810	814	722	**789.0**
			noFit	33	13	11	34	7	3	4	**15.0**
		Width	+/-0	51.5%	51.7%	52.9%	43.2%	45.3%	52.6%	40.9%	**48.3%**
			+/-1	86.3%	85.9%	94.4%	85.7%	83.6%	97.1%	89.9%	**89.0%**
			+/-2	95.1%	97.2%	98.3%	94.1%	89.0%	99.5%	97.8%	**95.9%**
			>+/-2	96.0%	98.4%	98.7%	95.8%	99.1%	99.6%	99.4%	**98.2%**
		Length	+/-0	77.5%	57.5%	71.0%	63.9%	-	-	-	**67.5%**
			+/-1	95.8%	92.9%	98.5%	90.8%	-	-	-	**94.5%**
			+/-2	96.0%	98.4%	98.7%	95.0%	-	-	-	**97.0%**
			>+/-2	96.0%	98.4%	98.7%	95.8%	-	-	-	**97.2%**
		Total	+/-0	**43.1%**	**34.5%**	**40.0%**	**29.1%**	**45.3%**	**52.6%**	**40.9%**	**40.8%**
			+/-1	**78.2%**	**64.1%**	**81.8%**	**71.2%**	**83.6%**	**97.1%**	**89.9%**	**80.9%**
			+/-2	**93.5%**	**91.2%**	**96.3%**	**87.3%**	**89.0%**	**99.5%**	**97.8%**	**93.5%**
			>+/-2	**96.0%**	**98.4%**	**98.7%**	**95.8%**	**99.1%**	**99.6%**	**99.4%**	**98.2%**
			noFit	**4.0%**	**1.6%**	**1.3%**	**4.2%**	**0.9%**	**0.4%**	**0.6%**	**1.8%**

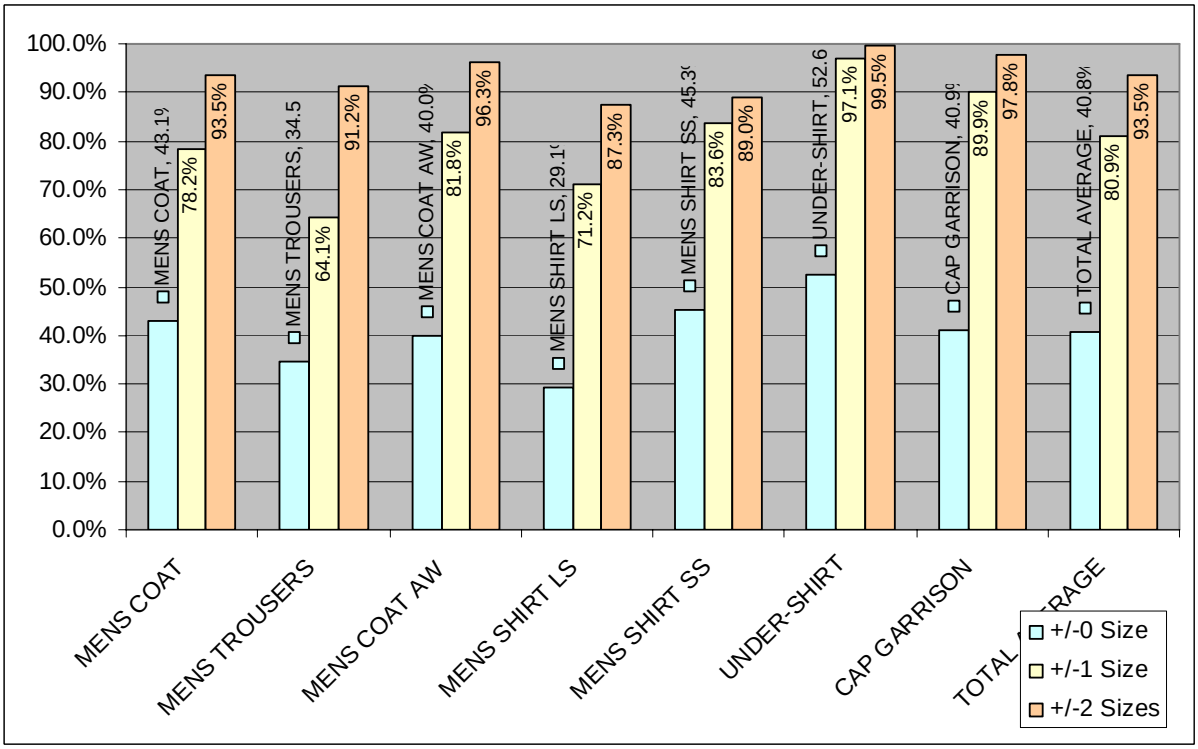


Figure 26: Evaluation of the fitting rates based on observed issued sizes for June 2004.

3.7.8 Final Size prediction configuration

The following table shows the final fitting rates for November, December 2004 as well as for March and April 2005.

Table 10: Fitting Rates for Nov04, Dec04, Mar05, Apr05 available under "3D Scan Accuracy".

Starting: 8/1/2004	Ending: 11/30/2004	Ending: 12/31/2004	Ending: 3/30/2005	Ending: 4/30/2005
Description	Accuracy Exact	Accuracy Exact	Accuracy Exact	Accuracy Exact
coat, man's	39.30%	39.79%	39.06%	36.73%
trousers, men's	32.81%	32.12%	32.12%	27.20%
coat, all-weather	46.36%	46.82%	43.78%	46.94%
Shirt, Man's - Long Sleeve	26.53%	25.87%	29.88%	29.89%
Shirt, Man's - Short Sleeve	37.58%	37.01%	39.37%	41.08%
undershirt, ctn white crewneck	53.08%	52.95%	58.72%	61.32%
	39.28%	**39.09%**	**40.49%**	**40.53%**
Description	Accuracy +/- 1	Accuracy +/- 1	Accuracy +/- 1	Accuracy +/- 1
coat, man's	82.68%	81.57%	84.68%	82.08%
trousers, men's	62.18%	67.41%	61.46%	52.72%
coat, all-weather	84.74%	84.77%	85.30%	86.68%
Shirt, Man's - Long Sleeve	70.64%	67.25%	76.59%	68.76%
Shirt, Man's - Short Sleeve	77.13%	74.01%	76.48%	78.33%
undershirt, ctn white crewneck	99.81%	99.90%	99.23%	99.56%
	79.53%	**79.15%**	**80.62%**	**78.02%**
Description	Accuracy +/- 2	Accuracy +/- 2	Accuracy +/- 2	Accuracy +/- 2
coat, man's	97.27%	96.60%	98.47%	98.23%
trousers, men's	88.77%	92.90%	91.01%	85.98%
coat, all-weather	98.26%	98.50%	98.81%	98.91%
Shirt, Man's - Long Sleeve	90.08%	90.21%	93.98%	89.66%
Shirt, Man's - Short Sleeve	89.04%	85.88%	88.67%	88.26%
undershirt, ctn white crewneck	100.00%	100.00%	100.00%	100.00%
	93.90%	**94.02%**	**95.16%**	**93.51%**

Effective November 2004, AdvanTech, Inc. created a web interface to request the processed and scanned recruit data on the ARN website at http://arn2.com under "3D Scan rate" (see Figures 27 and 28). The fitting rates are available online at the same website under "3D Scan Accuracy" (see Figure 28).

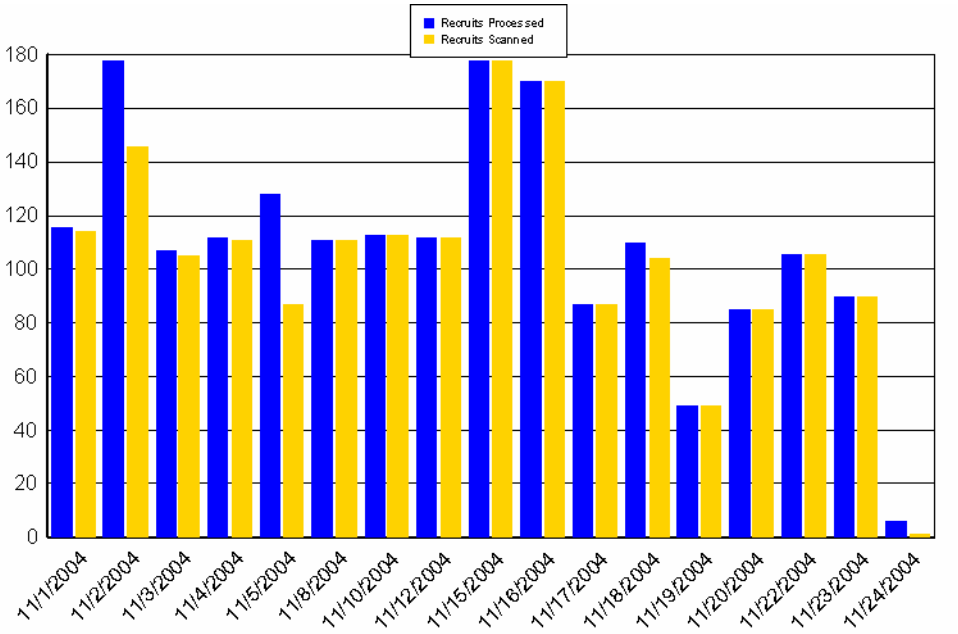


Figure 27: Example scan rates, absolute numbers

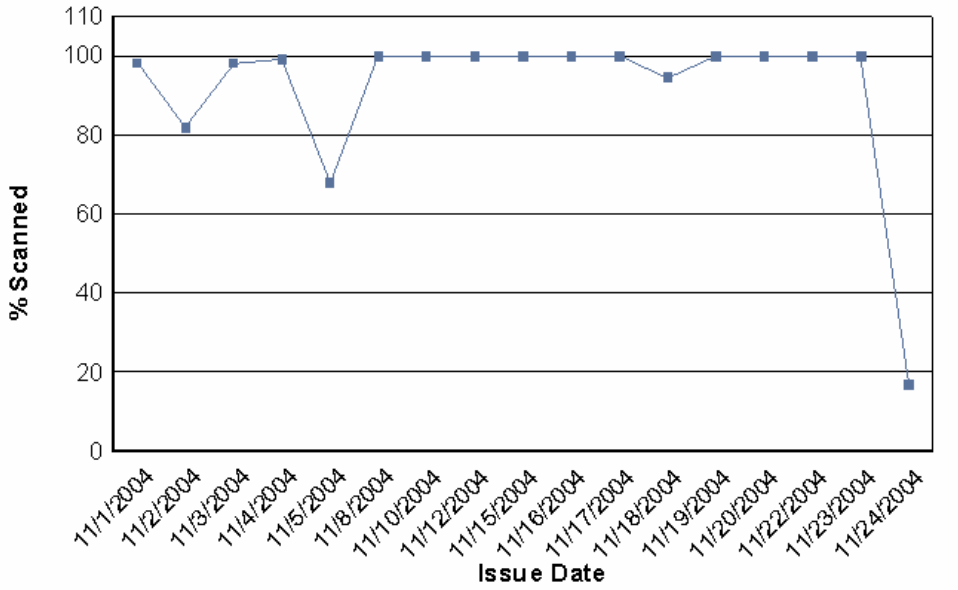


Figure 28: Example scan rates, percentage

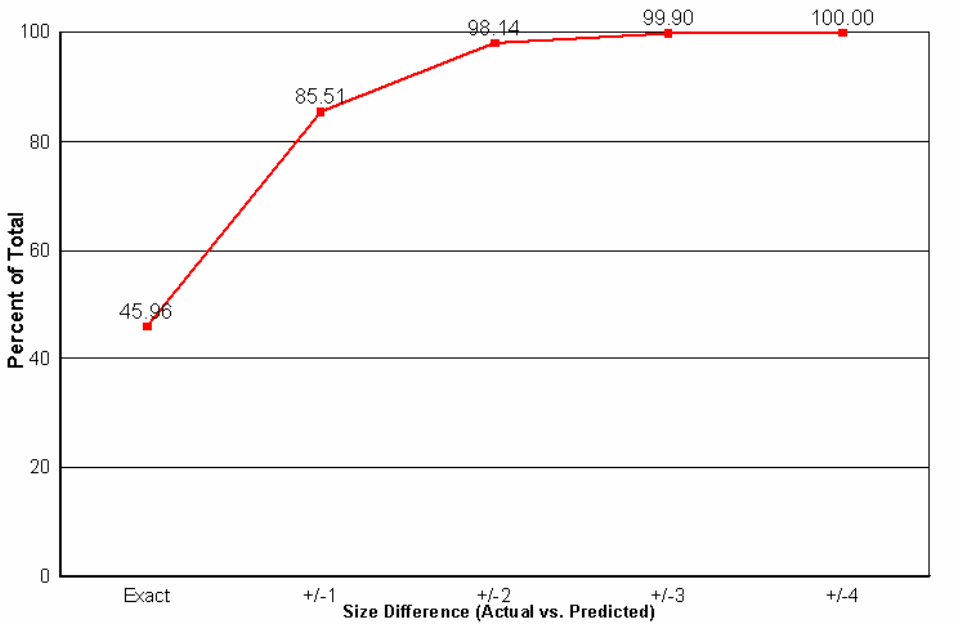


Figure 28: Example fitting rate

3.7.9 Comparison of Fitting Rates Evaluated Over Time

The Size Prediction Configuration was developed during the complete project period in order to improve the fitting rates according to the increasing number of scans and issue data over the time. The fitting rates achieved during this development process are summarized for each item in the following table. (Note: The percentages in the following table are formatted in the European style using a (,) rather than a (.) to indicate 10ths.)

Table 11: Fitting Rates Summary for Size Prediction Development Process

Configuration	Date			MENS COAT	MENS TROUSERS	MENS COAT AW	MENS SHIRT LS	MENS SHIRT SS	UNDER-SHIRT	CAP GARRISON	TOTAL AVERAGE
V0		**Total**	+/-0	**5,3%**	**0,0%**	**6,7%**	**1,1%**	**3,1%**	**0,0%**	**0,0%**	**2,3%**
			+/-1	**33,5%**	**56,1%**	**41,0%**	**8,7%**	**24,1%**	**0,0%**	**0,0%**	**23,3%**
			+/-2	**70,0%**	**87,3%**	**78,9%**	**24,6%**	**65,9%**	**0,0%**	**0,0%**	**46,7%**
V1.3	8 April-2004	**Total**	+/-0	**35,3%**	**25,1%**	**39,1%**	**28,5%**	**47,1%**	**55,8%**	**41,5%**	**38,9%**
			+/-1	**75,8%**	**56,1%**	**80,1%**	**67,5%**	**82,9%**	**98,1%**	**87,6%**	**78,3%**
			+/-2	**92,2%**	**87,3%**	**95,2%**	**87,8%**	**89,4%**	**99,7%**	**95,6%**	**92,5%**
V2.4	9-June-2004	**Total**	+/-0	**43,1%**	**34,5%**	**40,0%**	**29,1%**	**45,3%**	**52,6%**	**40,9%**	**40,8%**
			+/-1	**78,2%**	**64,1%**	**81,8%**	**71,2%**	**83,6%**	**97,1%**	**89,9%**	**80,9%**
			+/-2	**93,5%**	**91,2%**	**96,3%**	**87,3%**	**89,0%**	**99,5%**	**97,8%**	**93,5%**
V3.2	March 2005	**Total**	+/-0	**39,1%**	**32,1%**	**43,8%**	**29,9%**	**39,4%**	**58,7%**		**40,5%**
			+/-1	**84,7%**	**61,5%**	**85,3%**	**76,6%**	**76,5%**	**99,2%**		**80,6%**
			+/-2	**98,5%**	**91,0%**	**98,8%**	**94,0%**	**88,7%**	**100,0%**		**95,2%**

The different phase already mentioned above are shown in different colors in the table. Green marked entries indicated improvements of the fitting rates from the previous phase to the next. Finally, the progress of the fitting rates over the project period is visualized in detail for each item in the following diagrams.

Mens coat

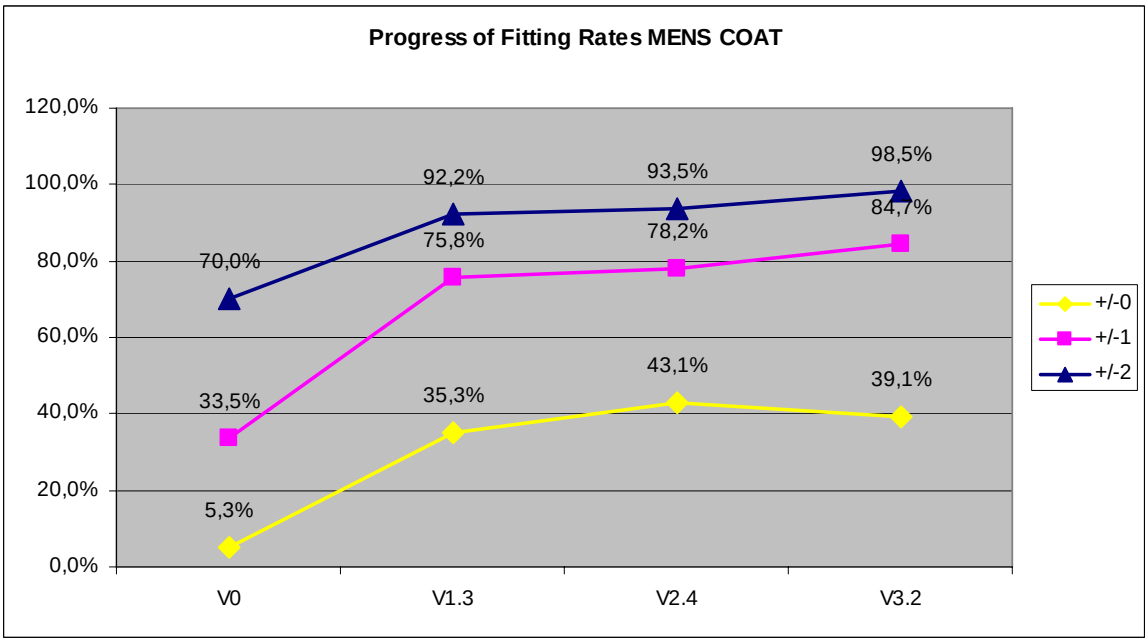


Figure 29: Progress of Fitting Rates for ARMY MENS COAT

Mens trouser

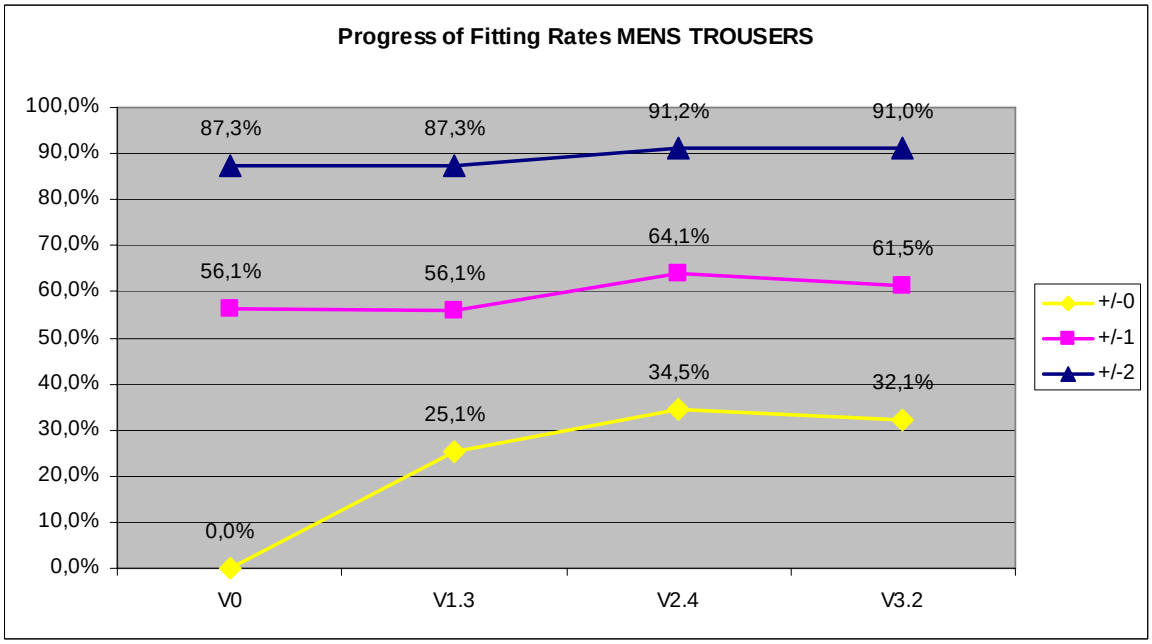


Figure 30: Progress of Fitting Rates for ARMY MENS TROUSERS

Mens Coat All Weather

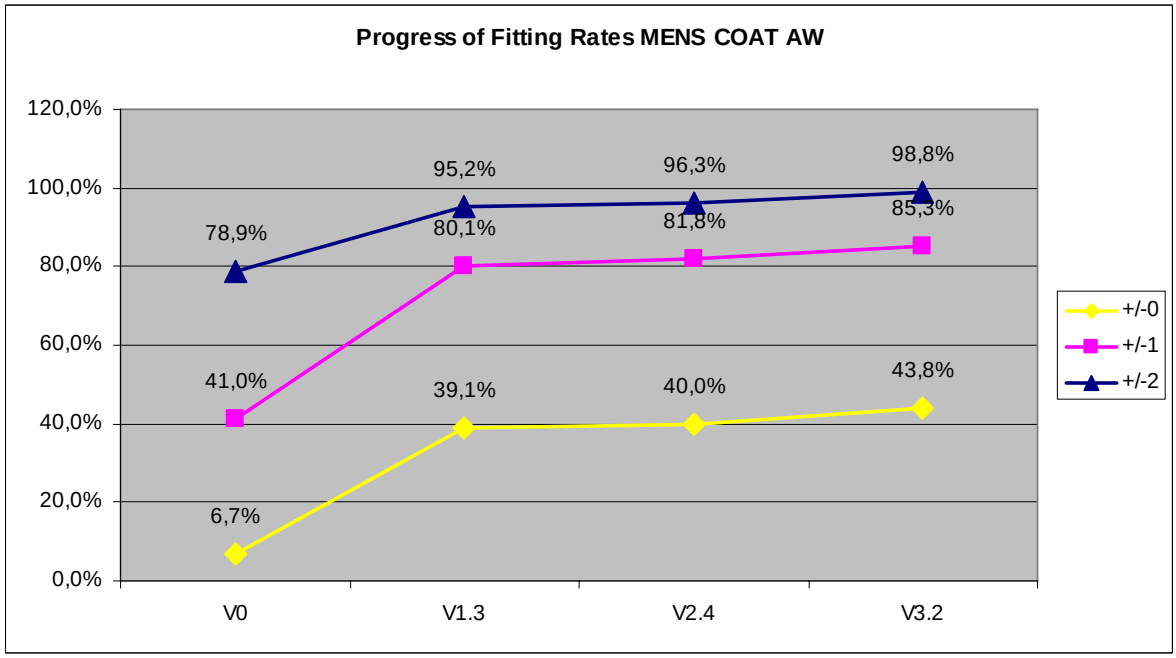


Figure 31: Progress of Fitting Rates for ARMY MENS COAT ALL WEATHER

Mens Shirt Long Sleeve

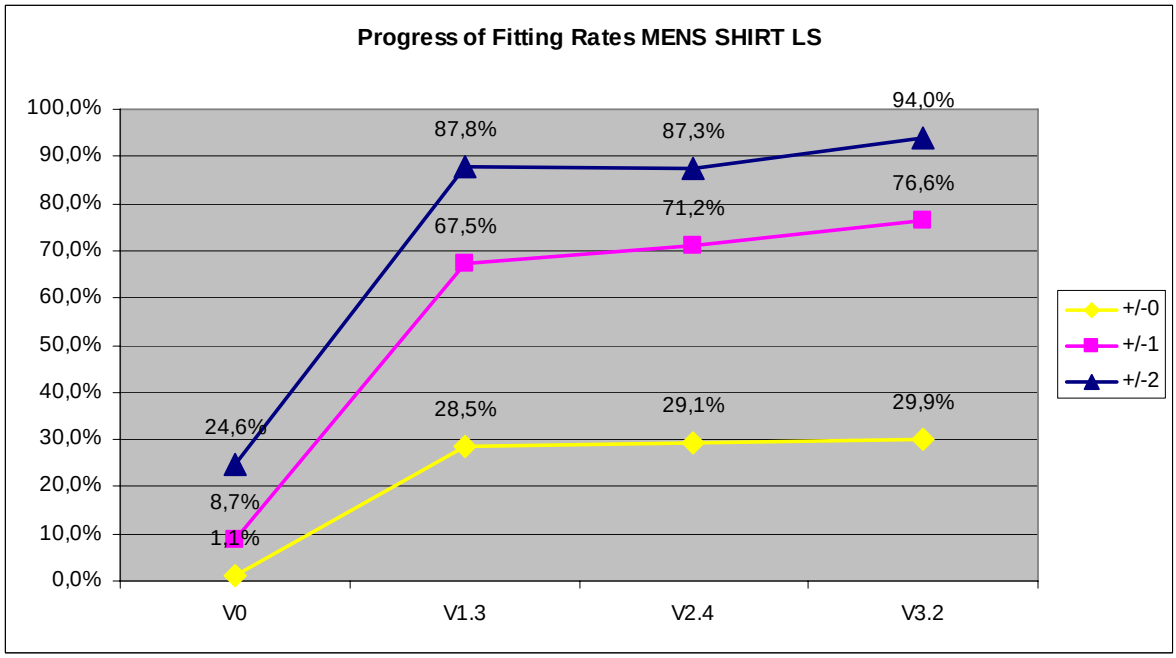


Figure 32: Progress of Fitting Rates for ARMY MEN'S SHIRT LONG SLEEVE

Mens Shirt Short Sleeve

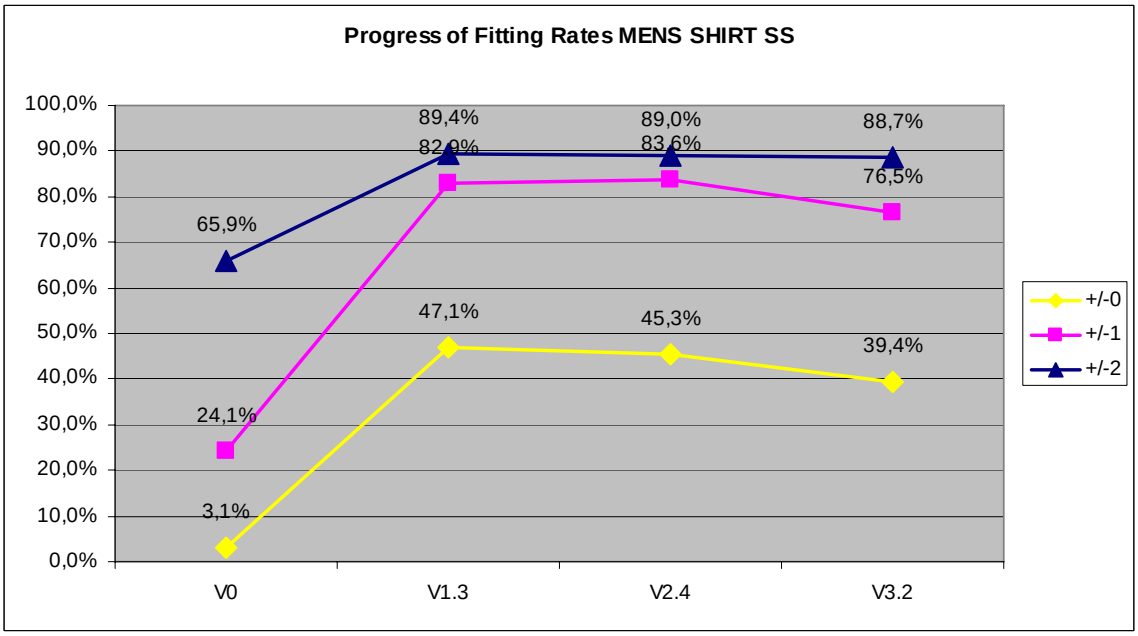


Figure 33: Progress of Fitting Rates for ARMY MENS SHIRT SHORT SLEEVE

Undershirt

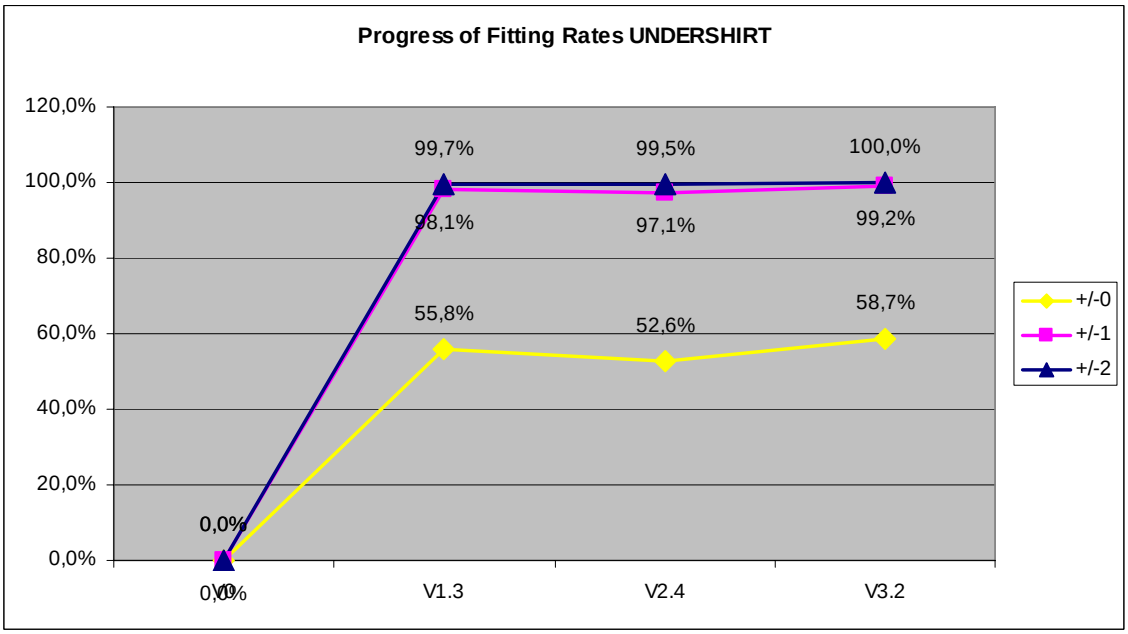


Figure 34: Progress of Fitting Rates for ARMY UNDERSHIRT

Cap Garrison

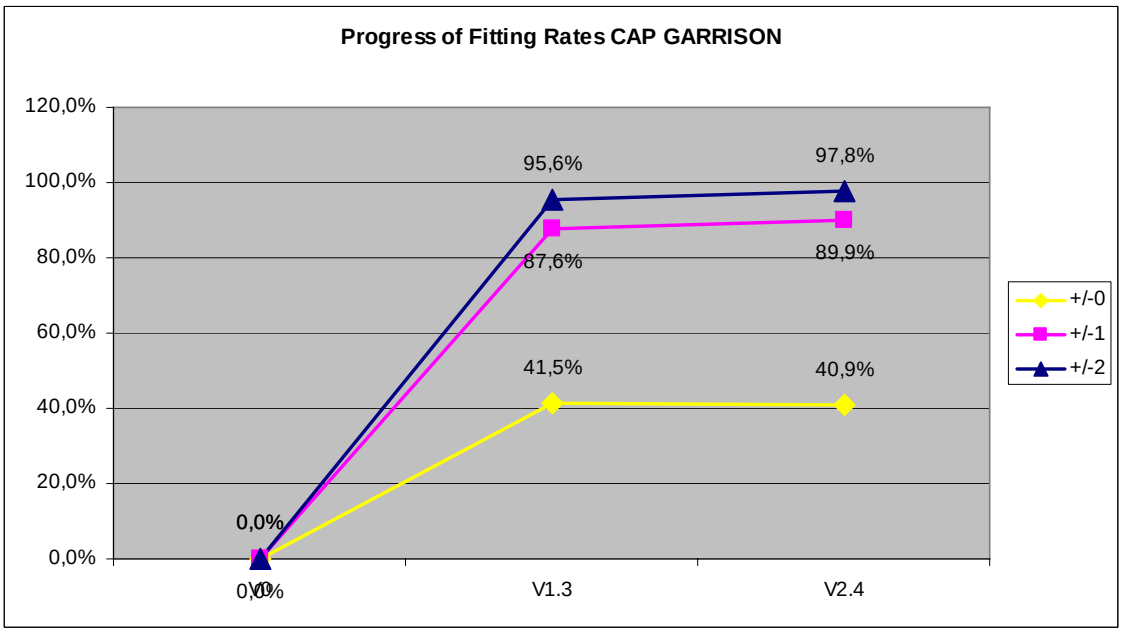


Figure 35: Progress of Fitting Rates for CAP GARRISON

The achieved fitting rates for all items are summarized in the following table. The diagram shows the average calculated for all items in the different periods and for the "+/-0", the "+/-1" and "+/-2" metrics.

All items

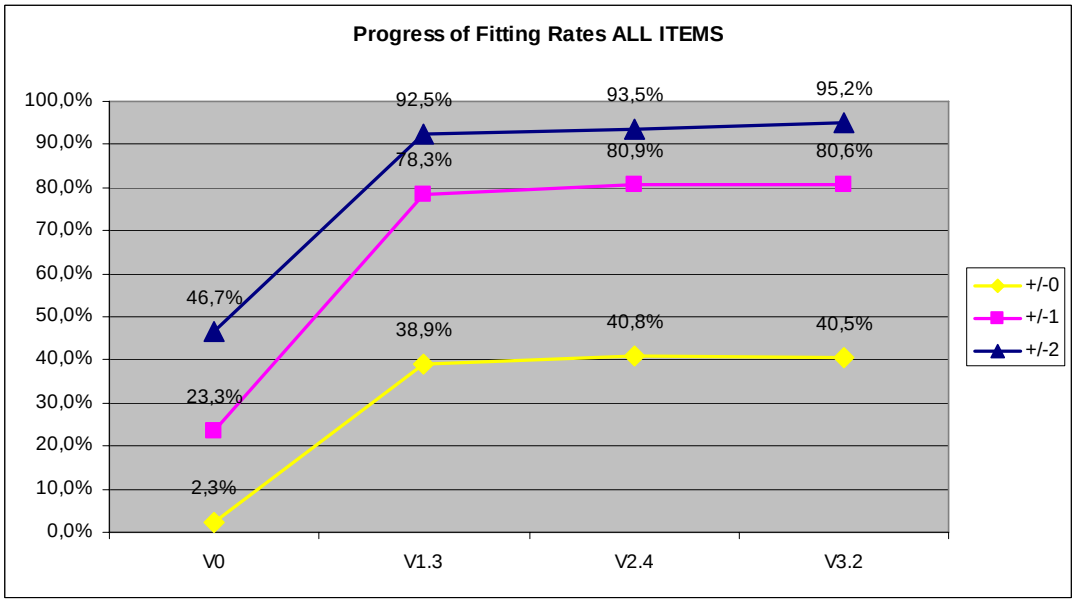


Figure 36: Progress of Fitting Rates for ARMY MENS COAT

3.7.10 Additional Variables Affecting the Size Selection

Size prediction is a multivariate classification problem, influenced by various factors beside body measurements. Influencing factors on size selection and fit of garment items are identified in the following figure.

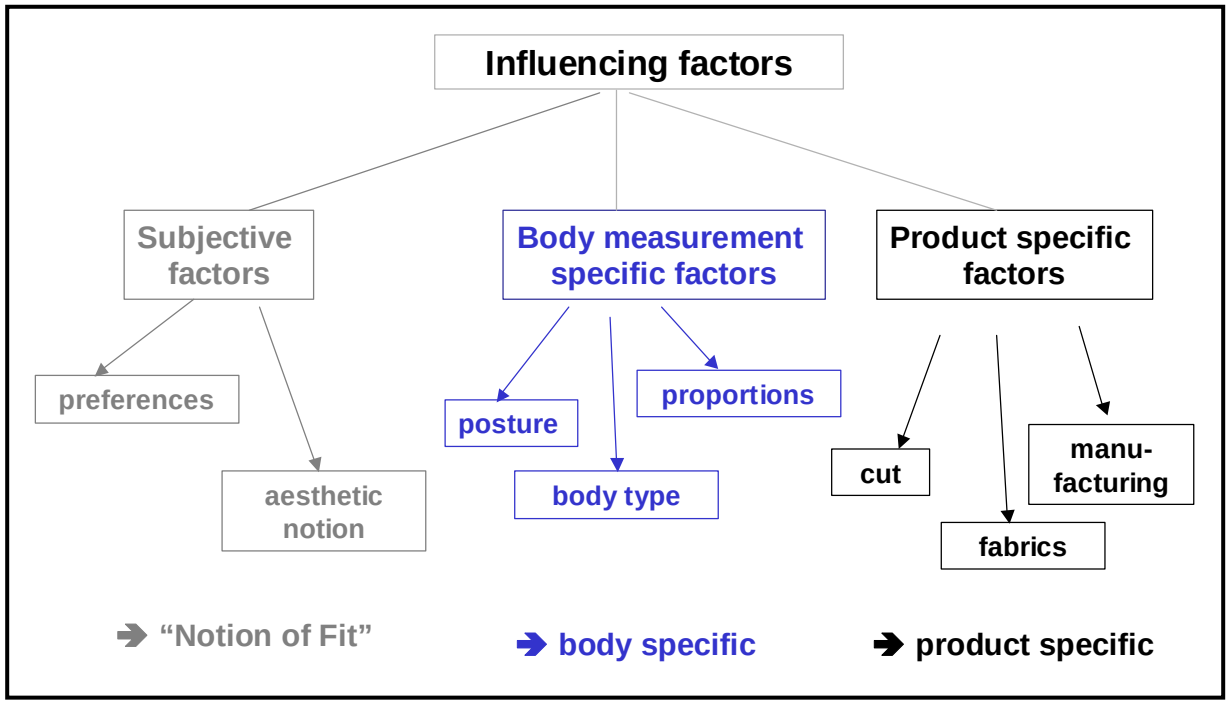


Figure 38: Driving factors of influence on garment size selection

The two main influencing factors are body proportions and posture of the recruit as well as the design, i.e., the concept of fit of the garments.

3.7.10.1 Body Proportions and Posture

Body proportions and posture of the subject strongly influence the selection of the best fitting size. Two subjects may have nominally identical body dimensions but one may have a different body shapes or postures. Both subjects may not fit into the same garment size.

This is illustrated in the following figure. Although the two recruits had nearly identical body measurements, the recruits were issued a different size for the Men's Coat. The first recruit was issued "39L" the second a "40L".

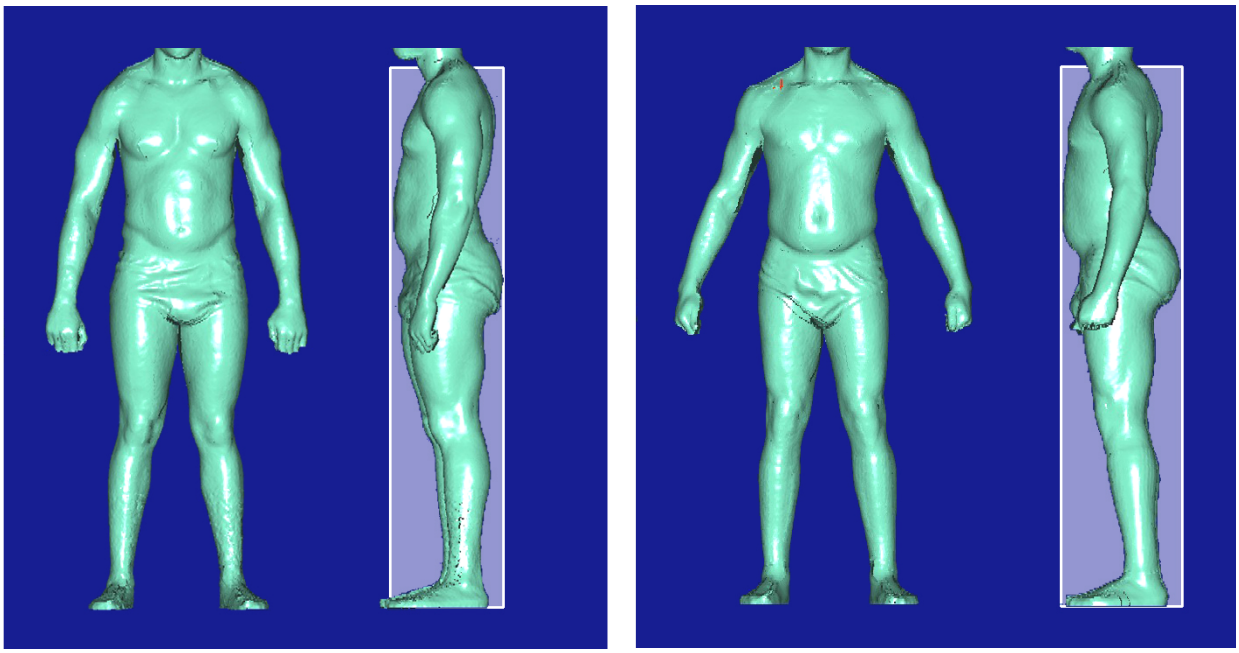


Figure 37: Male scans with the same body measurements, but different body shapes (Height 175 cm, chest girth 98,5 cm, waist 82 cm, hip girth 100 cm).

3.7.10.2 Concept of Fit

Sizing systems for garment items are based on long term experience of clothing designers and clothing technicians. Designing an appropriate sizing system is a manifold task, since different optimization criteria shall be fulfilled:

1. Optimize the "Fit" of each size with respect to anthropometrical, functional and aesthetic criteria while…
2. Maximizing the portion of the population which fits to the sizes and…
3. Minimizing the number of sizes.

The design of a sizing system typically is based on results achieved from anthropometrical measurement surveys. Sizes, i.e., combinations of body measurements, are than defined according to the correlations between different body measurements achieved from the statistical analysis of the measurement survey data.

Beneath these anthropometrical aspects of the size, system design functional requirements play an important role. These functional requirements typically result in ease definitions of the garment for different body areas. For tight fitting garments smaller ease values are defined, for loose fitting items the ease values are larger.

Additionally, aesthetic criteria are incorporated into the definition of the overall shape of the garment generated by the garment worn over the body.

Typically, the “Concept of Fit” is documented in Fit Manuals like the TM 10-227 (Army Technical Manual for Fitting Uniforms). The concept of fit is described visually by providing illustrations and photographs as well as quantitative verbal descriptions. Unfortunately, this information is insufficient for computations where a quantified description is needed like minimum and maximum ease values for body measurements used for size prediction.

A sample of the resulting inconsistency in the issuing of items is illustrated in the following figure. Although one would expect, that the Army Dress Uniform Coat and the Army All Weather Coat have a fixed sizing relation, the observation shows, that there are strong deviations between the issued sizes of these two items.

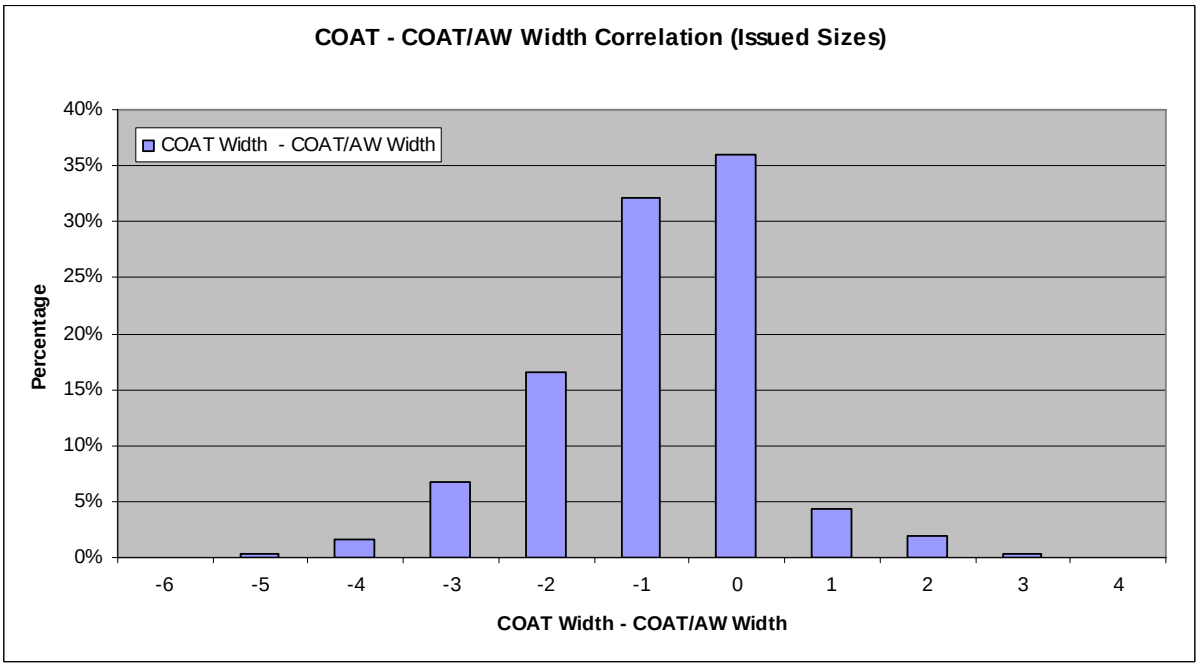


Figure 38: Relation between Sizes of the Dress Coat and the All Weather Coat based on Issued Size Data from 13,250 data sets

The statistics shows, that the “All Weather Coat” is predominantly issued in larger sizes than the “Dress Coat” and thus the size of the Coat simply cannot be used for sufficient prediction of the size of the appropriate “All Weather Coat.” Further, tariffs calculated for the Dress Coat will not be applicable for the “All Weather Coat.”

Within the chapter, the results achieved at Ft. Jackson based on the Human Solutions VITUS/Smart body scanner have been presented in detail. The results show that for selected items the size predication process could be automated successfully in order to support more efficient processes at the Fort Jackson issuing line and to predict tariff information as basis for demand driven procurement.

3.8 Additional Deliverables

During the meeting held on April 5, 2005, the following deliverables were specified as part of the Final Technical Report. The following list shows where these deliveries can be found:

1. Sampled data:
   - Body measurements extracted from male recruit scans during the project period. The body measurements have been transferred to AAVS data mart during the project period and thus are already available.
   - Issued size data for the items integrated to the automatic size prediction process. The body measurements have been transferred to AAVS data mart during the project period.
2. Statistical information on data: Appendix F – Statistical Analysis of the Body Measurements.
3. Relevant body dimensions driving the size selection: Table 8: Body Measurements Used for Size Selection.
4. Implementation of this knowledge in HS' SizeFit software (Appendix E – Final Size Prediction Configuration):
   a) Final Size Prediction Configuration;
   b) Size prediction tables and parameters; and,
   c) Weighting of body dimensions, i.e., what body dimensions are overruling other relevant dimensions.
5. Human Solutions measurement definitions for all of the measurements factored in to the size selection logic (See Appendix D – Body Dimensions used for Size Selection).
6. Identify the variables that could affect the size selection outside of the measurements, i.e., posture (see Section 3.7.10.1 – Body Proportions & Posture).
7. Fitting rates – The following information is provided in various tables identified that are provided in this report.
   - Accuracy against original table from fit manual (see Figure 21: Evaluation of the fitting rates based on Technical Specification Size Tables).
   - Accuracy against table with revisions from 2500 recruits (see Figure 25: Evaluation Of The Fitting Rates Based On Technical Specification Size Tables Merged With Observed Issued Of 2500 Recruits).

- Accuracy from June 2004 (see Figure 26: Evaluation of the fitting rates based on observed issued sizes for June 2004).
- Final Accuracy (see Table 10: Fitting Rates for Nov04, Dec04, Mar05, Apr05 available under "3D Scan Accuracy").
- Comparison of the fitting rates (see Section 3.7.9 - Comparison of Fitting Rates Evaluated Over Time).

4 Cyberware WBX 3D Body Scanners Use & Merlin Development

This section of the report presents the results of the work performed at US Marine Corps Recruit Depots to evaluate use and enhancement of Cyberware's 3D body scanning hardware and software, system. During the project, the Cyberware WBX 3D body scanner and software used at MCRD-PI was also installed as part of a systems upgrade at MCRD San Diego (MCRD-SD).

A second major task was related to the use of the Cyberware WBX scanners and ScanWorx software as compared to the use of the Human Solutions VITUS/Smart software. Project team members worked collaboratively to evaluate the use of different software for processing point cloud information generated by the Cyberware hardware and software for 3D body scanning.

The research and development of the Merlin software application was completed after the Cyberware WBX scanner had been installed at MCRD-SD and integrated with the ARN systems. The Merlin application was developed to evaluate potential to use different processing algorithms for generating size prediction information and to enhance recruit processing. Each of these separate but related activities is described in this section of the report.

4.1 Installation of Production WBX at MCRD-SD & ARN-IRM Integration

The main goals of the ARN 3D Whole Body scanning research initiatives have included research into the use of two different 3D Scanners with one manufactured by Human Solutions of North America and the other from Cyberware. For use of these scanners at both MCRD-PI and MCRD-SD, the objectives of the 3D whole body scanning research have been to:

- Establish base-line information for future contracting and manufacture of uniforms;
- Identify the correct uniform sizes required to reduce stock levels and increase efficiency; and,
- Enhance operations and the effectiveness for the complete uniform supply chain and thus drastically reduce costs in the overall process.

The main emphasis to-date in optimizing the military uniform supply chain has been research and evaluation of incorporating a 3D whole body scanner for automatic body dimension extraction and uniform garment size prediction.

Initial discussions for project activities included the replacement of the original prototype 3D Whole Body Scanner at MCRD-SD with the Cyberware WBX scanner. Plans were made to have the new WBX scanner shipped to MCRD-SD in October 2003.

Associated with this task was the evaluation and refinement of processing to achieve enhanced levels of performance for automatic size generation for uniform issue, and also evaluation of alternative software, i.e., ScanWorX to determine capability and

impact of using different software for processing data to achieve enhanced performance rates.

AdvanTech held discussions with personnel at MCRD-SD in assessing the proposed location of the replacement WBX scanner, projecting the communications components necessary to integrate ARN VIM-IRM and the scanner, and planning interface requirements.

Once the new scanner was in place, AdvanTech installed floor matting around the 3D Whole Body Scanner at MCRD-SD to improve the appearance and to provide better privacy. New photos were mounted on the scanner enclosure to clearly show the recruits how to stand while being scanned.

Figure 39: Enhanced Installation of Cyberware WBX 3D Scanner at MCRD-SD

AdvanTech also assisted MCRD-SD personnel with their inventory by providing on-site support, programming HHTs, ensuring data tables were prepared for the inventory, and conducted user training on the Inventory Module.

AdvanTech continued to provide ongoing training to employees at MCRD-SD and MCRD-PI. On 29 November 2004 AdvanTech hired a Customer Services Engineer for MCRD-PI to provide ongoing operational support and guidance on the integrated operation of ARN-IRM and the Scanner and to ensure that all recruits are scanned.

4.1.1 ARN Control Panel Interface to Cyberware WBX

AdvanTech worked with Cyberware on development of an interface between the Cyberware scanner and the ARN-IRM software at MCRD-SD. This interface is comparable to that installed at MCRD-PI. AdvanTech implemented the following MCRD-PI functionality and *.tcl formatting at San Diego:

- The operator opens the Control Panel.
- They select the 3D Scanner Button.

- A screen comes up and asks for the Platoon being processed.
- Data for all recruits is placed into recruitdata.txt in c:\Recruit_ID folder. The text file is a tab delimited showing Platoon, SSN, Last Name and Status (A/R).
- The Control Panel then executes the Digisize program.
- There are 2 windows in the Digisize functionality. One window for recruits not yet scanned and the other for recruits that have been scanned. The operator click on the name of the recruit entering the scanner. As the recruits get scanned, their name moves from the 1st window to the 2nd.
- There is another function that allows the operator to manually enter the recruit's platoon, SSN and Last name if needed.
- The scan occurs and the *.tcl file gets generated including Platoon, SSN and Last Name. Documents were provided that show the differences between the tcl files at PI and San Diego.
- The *.tcl files are then saved in multiple sub-folders in the c:\arn_archive\USMC\San Diego\ folder.
- The daemon software (now renamed to Merlin) locates the *.tcl files and if the info_scan_quality = "unclassified" then the data is imported into the appropriate control panel. Once the data is imported the *.tcl file is renamed to *.tc1.

AdvanTech made changes to the program that converts the *.tcl into the scan forms so the *.tcl files are no longer renamed or archived to another location. Additionally, renamed the old *.tc1 files back to *.tcl and copied them back to their original location.

AdvanTech completed this coding and shipped the revised program to Parris Island. Upon final and successful testing at Parris Island, the same program was installed at San Diego and user training of the MCRD San Diego personnel through the entire 10 steps detailed above.

4.1.2 Integration of the Cyberware WBX Scanner to ARN-VIM

The Cyberware WBX 3D Whole Body Scanning Capabilities were previously implemented at the US Marine Corps Recruit Training Centers at Parris Island (MCRD-PI). AdvanTech implemented hardware, software, and communication components preparatory to upgrade of the MCRD-SD legacy system to ARN VIM-IRM, followed by a new interface to the new WBX 3D Whole Body Scanner. The ARN-LAN was implemented on the MCRD-SD fiber network. Full network functionality permitted ARN VIM-IRM to proceed to an operational status.

Following the installation of the new Cyberware WBX 3D Whole Body Scanner at MCRD-SD, the software was integrated with the other ARN systems at this location. Thus, one of the tasks accomplished during this project involved the insertion of the Cyberware WBX 3D Whole Body Scanner at MCRD-SD into the normal flow of the CIIP,

and its integration to VIM-IRM to establish a fully automated supply chain management solution.

After AdvanTech completed the integration of capabilities for use of the 3D whole Body Scanner including capabilities to generate the uniform issue documents at MCRD-SD, these capabilities were not activated or fully implemented by choice of personnel at MCRD-SD. They explained that their reasoning for not activating the full capabilities at MCRD-SD were based on differences in the training schedules that reduced the amount of time available to accomplish scanning 100% of the recruits as is done at MCRD-PI.

4.2 Results of WBX 3 D Scanner Upgrade at MCRD-SD

The WBX 3D Whole Body Scanner was installed at Marine Corps Recruit Depot during April 2001, replacing the older WB4 model put in service in 1998. The WBX provided the following enhancements/improvements:

- Increased throughput of recruits - scan speed increased to approximately 25 seconds per scan versus 45 seconds required with the Cyberware WB4 prototype scanner.
- Resolution was improved, increasing the accuracy of the scan data collected and size prediction information.
- The new unit required less space with a reduced footprint of 8'x 8' versus 10'x 10' for the prototype WB4 scanner.
- The scanning activities were placed in a self-contained enclosure for added privacy.
- Reduced price and maintenance costs were achieved for the government for on-going use and research with this equipment.

4.3 Evaluation of Alternatives for 3D Scan Processing

One area of research during this project was the evaluation of the capability of using the Human Solutions software to process scans generated by the Cyberware WBX scanners. To complete this evaluation, the project team converted the proprietary file format generated by the Cyberware WBX software into a format that could be read by the Human Solutions software.

AdvanTech and Human Solutions worked together with Cyberware on this task to provide a sample of Cyberware data files. Cyberware assisted AdvanTech in the conversion of these files for evaluation. Human Solutions then analyzed Cyberware WB4 scans with respect to possibilities to import Cyberware scans and to process body measurements with ScanWorX. The results were positive.

The 3D Cyberware whole body scans at MCRD-PI and MCRD-SD are created in an Open Inventor format (*.iv files). Since the files are written in a binary format, and the

Open Inventor is ambiguous in its 'standard' description, it is not possible to read the files without knowing their structure and encoding.

In February 2004, Cyberware provided a CyScan software-license for a 30 days limited period. For test purposes, Cyberware assisted in the conversion of a sample of *.iv files to *.ply files that can be read by ScanWorX. The files needed an additional transformation in order to match the coordinate system of the two different scan processing software systems. Size selection tables were evaluated for both MCRDs, and Cyberware *.iv files were run through a converter for use in testing Human Solutions ScanWorX software.

This support enabled Human Solutions to use the converted *.iv files. These files had been generated by the Cyberware WBX Scanner and then converted into readable ScanWorX files for further processing and comparison of the body measurements. All WBX scans were processed and it turned out that the deviations in most body dimensions were acceptable for further use in size selection. For some measurements (e.g., body height) a systematic deviation was detected.

A set of 59 WBX scans was pulled from the DSCP servers where the data was archived. These were converted by merging the single scan patches and aligning the scan to the SWX coordinate system. The following steps were accomplished:

- The converted scans were processed with the ScanWorX body measurement extraction software and the results were compared with the body measurements extracted by the Cyberware software in the corresponding *.tcl files.
- The body measurements extracted with both methods were compared and statistically analyzed. The results can be summarized as follows:
  - All scans could be loaded with the HS ScanWorX software after conversion.
  - The scans show "holes" caused by the single triangulation configuration (only one camera per laser at WBX compared to two cameras per laser of VITUS/Smart).
  - All scans could be processed for body measurements. For most of the measurements analyzed it turned out, that the deviations were acceptable for further processing.
  - For some measurements (e.g. Body Height) a systematic deviation was detected.

The results of the preceding research and analysis were presented and discussed at the ARN Review Meeting in McLean on 19 February 2004. As a result of this activity, it was determined that:

- Cyberware scans of MCRD-SD and MCRD-PI can be transformed into a format that can be read and processed by Human Solutions ScanWorX body measurement extraction software.
- The process is time consuming since the systems use different coordinate systems to represent the scans and thus the scans have to be rotated before they can be processed. This process would require additional modification to existing software to provide automated support of this processing step.
- Body measurement extraction from Cyberware and Human Solutions showed comparable results. For some body dimensions a systematic deviation was observed that could be compensated for by a linear transformation and processing of scan data.
- The size prediction accuracy for Cyberware scans with Human Solutions size prediction software and vice versa was not tested. This would have required a significant amount of research using the same subjects and both scanners and since the scanners were not co-located, it was not possible to accomplish this comparative analysis.

4.4 Development and Implementation of Merlin Software

Initially, the Merlin application was developed to automatically extract the predicted sizes from the output of either the Cyberware or Human Solutions 3D whole body scanners. The name “Merlin” was used in reference to the magician in King Arthur’s Camelot simply because the predicted sizes “magically appeared” in the Integrated Retail Module Scan Forms developed and implemented as part of the ARN systems.

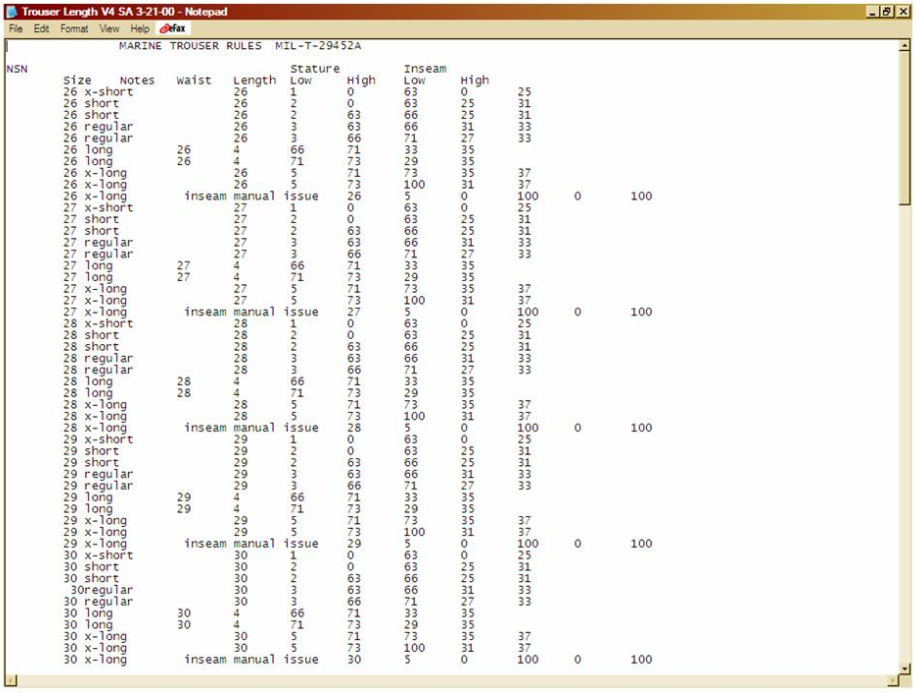
The Merlin system was initially developed under this task to replace the daemon system at Ft. Jackson that was originally developed at Parris Island to interface with DigiSize. It became the interface for passing recruit information to both the ScanWorX and DigiSize and receiving the measurement extraction and size prediction information into the IRM. In parallel under this task, independent size selection capability for the Merlin was developed and implemented at Parris Island.

The Merlin program was developed so that it could run independently on any of the local workstations at a site as long as the software had network connectivity to the 3D Scanner “Processing” Computer where the output files from the body scans were located. This was evaluated at the RTCs at MCRD-PI and SD and at the Ft. Jackson CIIP.

At Fort Jackson, the design for the Merlin system as developed and implemented, provided for the extraction of the predicted sizes. The software then generated the IRM Scan Forms using the predicted size plus 9 alternate sizes around the predicted size. The predicted sizes were then stored in a separate “items” table where they could later be used to generate comparison “Predicted versus Actual” prediction analysis.

The same program was used for the Cyberware 3D Body Scanners at both Marine Corps Recruit Training Depots (MCRD) at Parris Island and San Diego. However, as part of Cyberware's "Digisize" software that was developed for ARN as part of the 3D Scanner implementation at MCRD San Diego, the measurement ranges required for the predictions were incorporated directly into the program code.

These measurement ranges could not be changed without having the Cyberware programmers modify, recompile and re-install the Digisize software. The data reflected the initial size ranges developed from the MILSPEC documents that were compiled into simple text files by Carol Ring Ellis under previous ARN research activities. The following figures show the format of this text file for the Marine Corps Green Trousers (see Figure "Size Measurement for Green trouser (Length)" and Figure "Size Measurements for Green Trouser (Waist)").

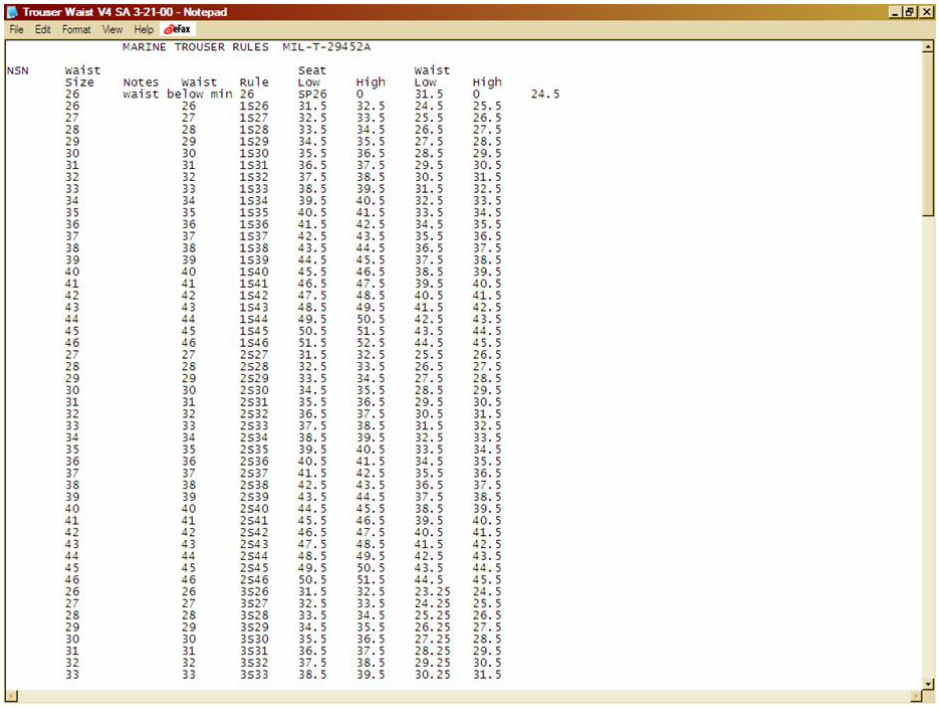

Trouser Length V4 SA 3-21-00 - Notepad

File Edit Format View Help eFax

MARINE TROUSER RULES MIL-T-29452A

NSN Size	Notes	Waist	Length	Stature Low	Stature High	Inseam Low	Inseam High			
26 x-short			26	1	0	63	0	25		
26 short			26	2	0	63	25	31		
26 short			26	2	63	66	25	31		
26 regular			26	3	63	66	31	33		
26 regular			26	3	66	71	27	33		
26 long		26	4	66	71	33	35			
26 long		26	4	71	73	29	35			
26 x-long			26	5	71	73	35	37		
26 x-long			26	5	73	100	31	37		
26 x-long		inseam	manual	issue	26	5	0	100	0	100
27 x-short			27	1	0	63	0	25		
27 short			27	2	0	63	25	31		
27 short			27	2	63	66	25	31		
27 regular			27	3	63	66	31	33		
27 regular			27	3	66	71	27	33		
27 long		27	4	66	71	33	35			
27 long		27	4	71	73	29	35			
27 x-long			27	5	71	73	35	37		
27 x-long			27	5	73	100	31	37		
27 x-long		inseam	manual	issue	27	5	0	100	0	100
28 x-short			28	1	0	63	0	25		
28 short			28	2	0	63	25	31		
28 short			28	2	63	66	25	31		
28 regular			28	3	63	66	31	33		
28 regular			28	3	66	71	27	33		
28 long		28	4	66	71	33	35			
28 long		28	4	71	73	29	35			
28 x-long			28	5	71	73	35	37		
28 x-long			28	5	73	100	31	37		
28 x-long		inseam	manual	issue	28	5	0	100	0	100
29 x-short			29	1	0	63	0	25		
29 short			29	2	0	63	25	31		
29 short			29	2	63	66	25	31		
29 regular			29	3	63	66	31	33		
29 regular			29	3	66	71	27	33		
29 long		29	4	66	71	33	35			
29 long		29	4	71	73	29	35			
29 x-long			29	5	71	73	35	37		
29 x-long			29	5	73	100	31	37		
29 x-long		inseam	manual	issue	29	5	0	100	0	100
30 x-short			30	1	0	63	0	25		
30 short			30	2	0	63	25	31		
30 short			30	2	63	66	25	31		
30regular			30	3	63	66	31	33		
30 regular			30	3	66	71	27	33		
30 long		30	4	66	71	33	35			
30 long		30	4	71	73	29	35			
30 x-long			30	5	71	73	35	37		
30 x-long			30	5	73	100	31	37		
30 x-long		inseam	manual	issue	30	5	0	100	0	100

Figure 40: Size Measurements for Green Trouser (Length)



Trouser Waist V4 SA 3-21-00 - Notepad

File Edit Format View Help

MARINE TROUSER RULES MIL-T-29452A

NSN	waist Size	Notes	waist	Rule	Seat Low	High	waist Low	High	
	26	waist below min	26		SP26	0	31.5	0	24.5
	26		26	1S26	31.5	32.5	24.5	25.5	
	27		27	1S27	32.5	33.5	25.5	26.5	
	28		28	1S28	33.5	34.5	26.5	27.5	
	29		29	1S29	34.5	35.5	27.5	28.5	
	30		30	1S30	35.5	36.5	28.5	29.5	
	31		31	1S31	36.5	37.5	29.5	30.5	
	32		32	1S32	37.5	38.5	30.5	31.5	
	33		33	1S33	38.5	39.5	31.5	32.5	
	34		34	1S34	39.5	40.5	32.5	33.5	
	35		35	1S35	40.5	41.5	33.5	34.5	
	36		36	1S36	41.5	42.5	34.5	35.5	
	37		37	1S37	42.5	43.5	35.5	36.5	
	38		38	1S38	43.5	44.5	36.5	37.5	
	39		39	1S39	44.5	45.5	37.5	38.5	
	40		40	1S40	45.5	46.5	38.5	39.5	
	41		41	1S41	46.5	47.5	39.5	40.5	
	42		42	1S42	47.5	48.5	40.5	41.5	
	43		43	1S43	48.5	49.5	41.5	42.5	
	44		44	1S44	49.5	50.5	42.5	43.5	
	45		45	1S45	50.5	51.5	43.5	44.5	
	46		46	1S46	51.5	52.5	44.5	45.5	
	27		27	2S27	31.5	32.5	25.5	26.5	
	28		28	2S28	32.5	33.5	26.5	27.5	
	29		29	2S29	33.5	34.5	27.5	28.5	
	30		30	2S30	34.5	35.5	28.5	29.5	
	31		31	2S31	35.5	36.5	29.5	30.5	
	32		32	2S32	36.5	37.5	30.5	31.5	
	33		33	2S33	37.5	38.5	31.5	32.5	
	34		34	2S34	38.5	39.5	32.5	33.5	
	35		35	2S35	39.5	40.5	33.5	34.5	
	36		36	2S36	40.5	41.5	34.5	35.5	
	37		37	2S37	41.5	42.5	35.5	36.5	
	38		38	2S38	42.5	43.5	36.5	37.5	
	39		39	2S39	43.5	44.5	37.5	38.5	
	40		40	2S40	44.5	45.5	38.5	39.5	
	41		41	2S41	45.5	46.5	39.5	40.5	
	42		42	2S42	46.5	47.5	40.5	41.5	
	43		43	2S43	47.5	48.5	41.5	42.5	
	44		44	2S44	48.5	49.5	42.5	43.5	
	45		45	2S45	49.5	50.5	43.5	44.5	
	46		46	2S46	50.5	51.5	44.5	45.5	
	26		26	3S26	31.5	32.5	23.25	24.5	
	27		27	3S27	32.5	33.5	24.25	25.5	
	28		28	3S28	33.5	34.5	25.25	26.5	
	29		29	3S29	34.5	35.5	26.25	27.5	
	30		30	3S30	35.5	36.5	27.25	28.5	
	31		31	3S31	36.5	37.5	28.25	29.5	
	32		32	3S32	37.5	38.5	29.25	30.5	
	33		33	3S33	38.5	39.5	30.25	31.5	

Figure 41: Size Measurements for Green Trouser (Waist)

The scope of building the logic into the Merlin to generate the predicted sizes also included establishing within a standard Microsoft SQL database structure the tables to first easily replicate the measurement ranges in the initial text files. The second part was to establish a second table where the end user would be able to easily "tweak" or adjust each body measurement to better reflect the preferences each site's "Concept of Fit."

For this test, AdvanTech used the data for the Marine Corps Dress Uniform initially established in **ARN I** and tested the logic and capabilities using the 3D Body scanner at MCRD-Parris Island. Listed below were the dress uniform items being predicted at Parris Island:

Table 12: Dress Uniform PGC Items Predicted at MCRD-PI

PGC	PGC Description
01683	Coat, All-Weather, Man's
01876	Shirt, Man's Poly/Wl L/S
01887	Shirt, Man's Khaki Short Sleeve
02043	Trousers, Men's, P/W, Gab, Green

02044	Trousers, Men's, P/W, Gab, Blue
02765	Sweater

Using the Tress Green Trousers as the example, the “Size Lookup” table was established based on the following logic:

- What body measurements were needed to predict the size?
- What are the appropriate measurement ranges needed for each body measurement in order to predict the correct size?

As is shown in the following figure (See “Merlin Table Structure for Predicting Marine Corps Dress Trousers”) the table structure illustrated depicts:

1. Final Predicted Size (26 Regular)
2. Appropriate Body Measurement needed (Inseam, Seat, Stature and Waist)
3. Low Measurement in Inches
4. High Measurement in Inches
5. Range in inches between the High and Low Measurements

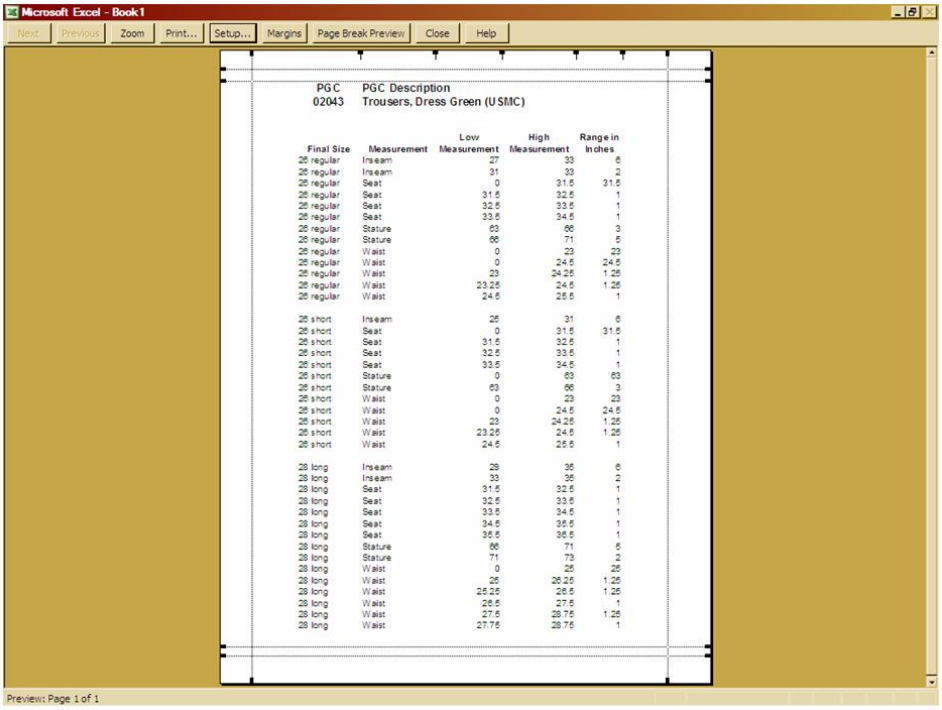
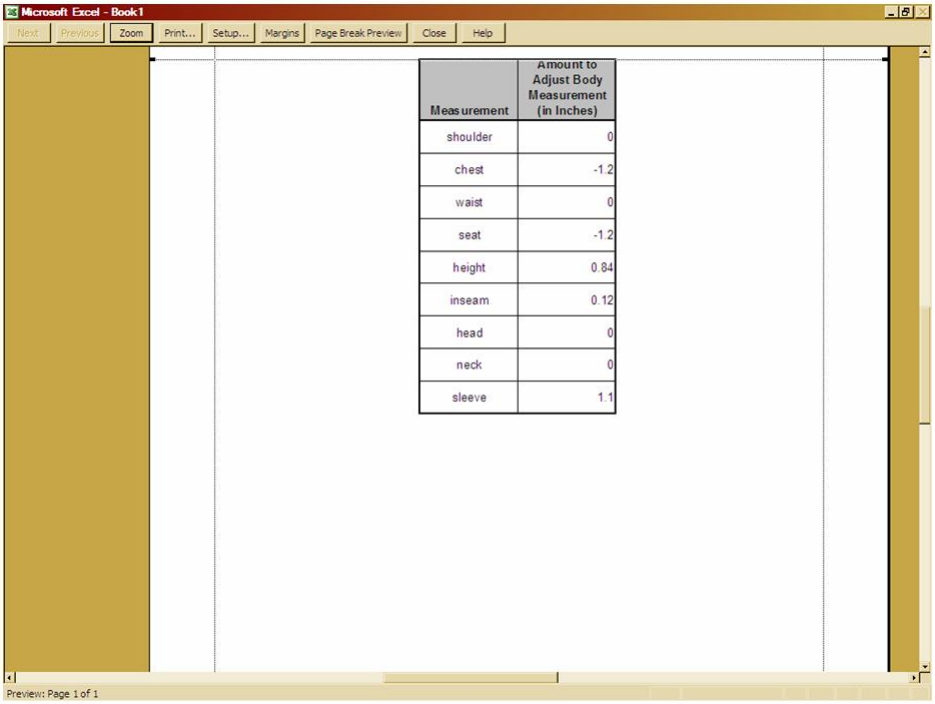


Figure 42: Merlin Table Structure for Predicting Marine Corps Dress Trousers

Finally, the “Adjust Size” table was established to “tweak” or alter the body measurement figures to better reflect the sizes being predicted based on each site’s “Concept of Fit.” The user would be able to either add or subtract from each body measurement prior to predicting the size. Table 3 shows the table structure of this “Adjust Size” table. As shown in the table, the Merlin would: subtract 1.2 inches from the chest measurement; subtract .12 inches to the seat; add .84 inches to the height; and, add 1.1 inches to the sleeve.

Table 13: “Adjust Table” structure



Measurement	Amount to Adjust Body Measurement (in Inches)
shoulder	0
chest	-1.2
waist	0
seat	-1.2
height	0.84
inseam	0.12
head	0
neck	0
sleeve	1.1

As new items would be added into the predicted items list, the data would be added into the “Size Lookup” table using the appropriated MILSPEC data. The “Adjust Size” table would be “tweaked” as the Predicted Sizes were compared to the Final Size issued.

At MCRD-PI alternate size selection tables were completed, were placed into production, and were evaluated for impacts on accuracy. Personnel were trained to actively use scan forms and to increase speed and accuracy in conjunction with ARN IRM processing.

As of the end of the delivery order, the initial results achieved with the use of the Merlin software for the 5 items, when compared to Cyberware’s Digisize were as follows.

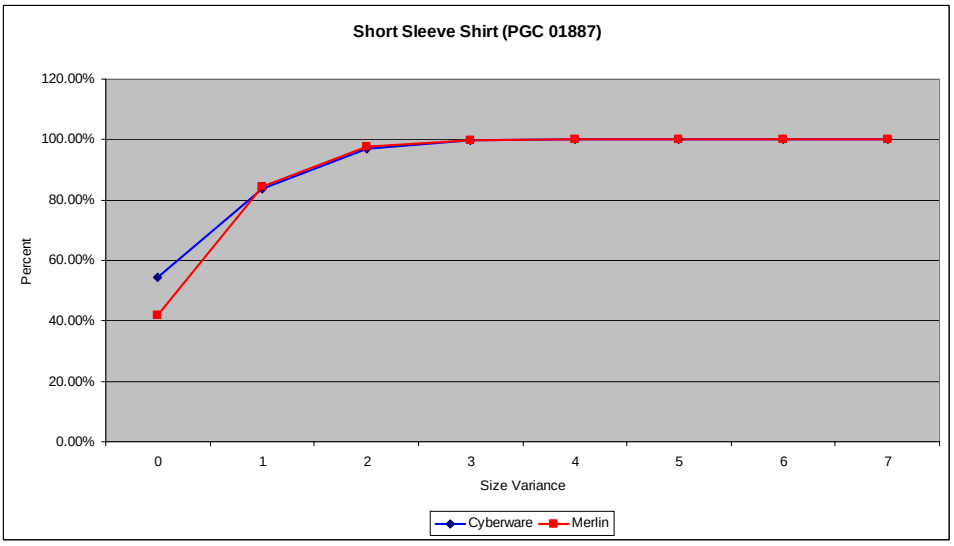


Figure 43: Comparison of results achieved with Merlin v. Digisize software (PGC 01887 Short Sleeve Shirt)

Figure 44: Comparison of results achieved with Merlin v. Digisize software (PGC 01876 Long Sleeve Shirt)

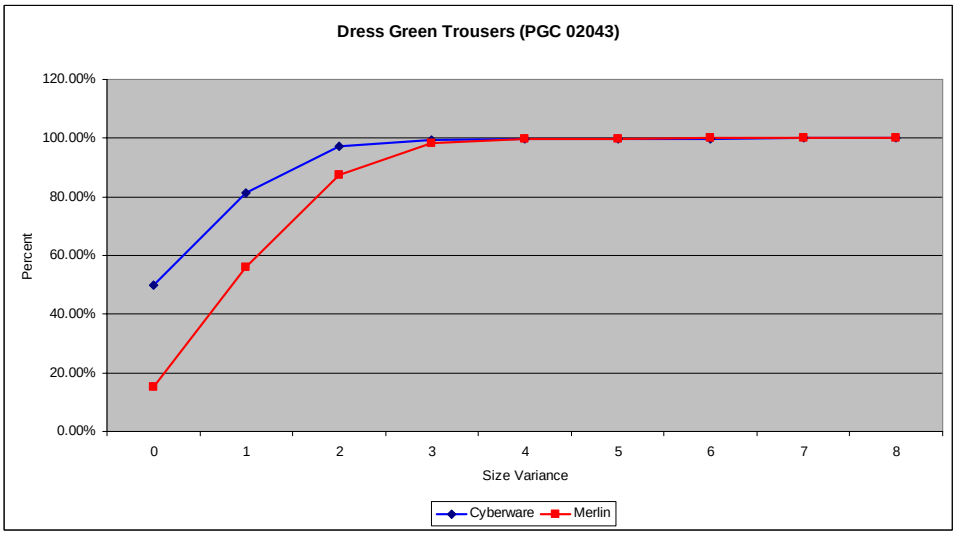


Figure 45: Comparison of results achieved with Merlin v. Digisize software (PGC 02043 Dress Green Trousers)

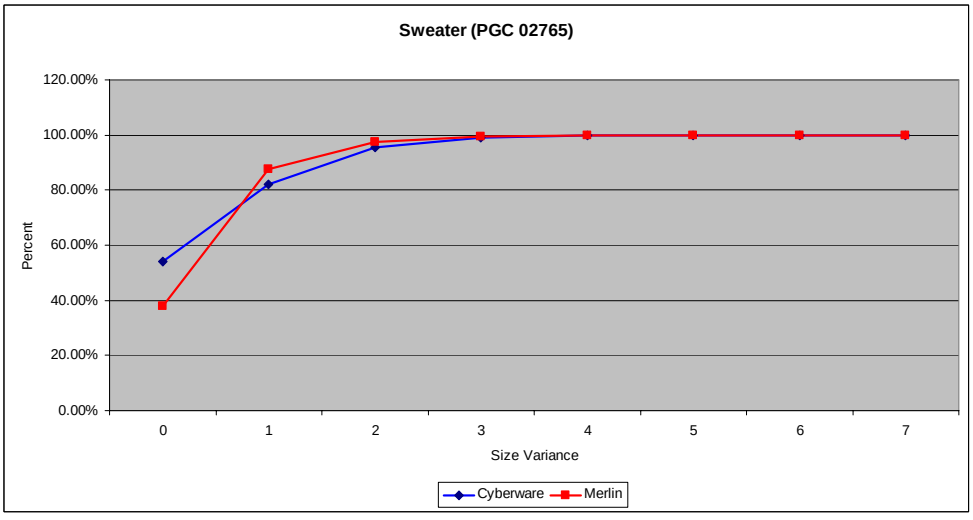


Figure 46: Comparison of results achieved with Merlin v. Digisize software (PGC 02765 Sweater)

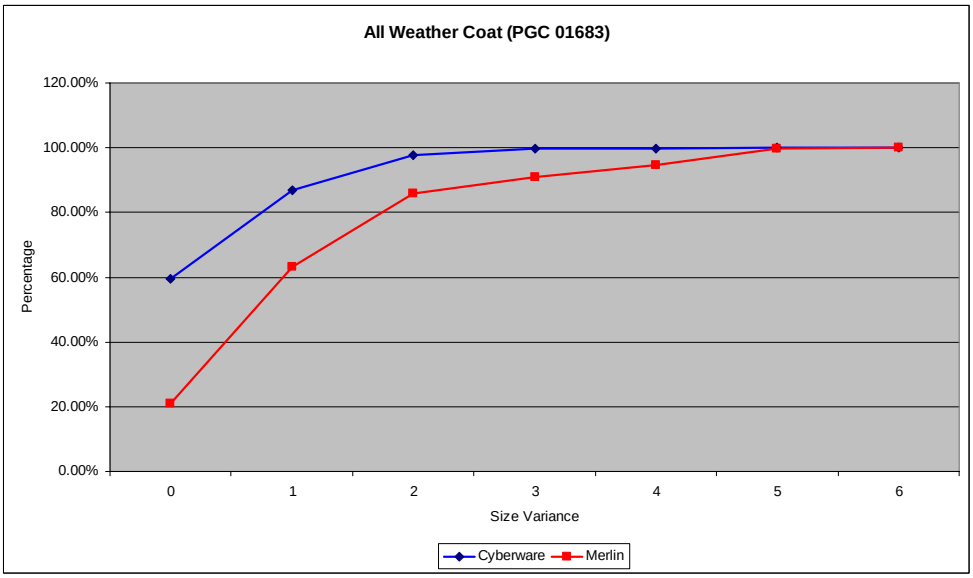


Figure 47: Comparison of results achieved with Merlin v. Digisize software

(PGC 01683 All Weather Coat)

Subsequent to the initial testing, additional research work was planned to refine the processing algorithms and enhance the results achieved. The results of this project indicated that the Merlin software capabilities did provide acceptable performance and allow for machine/hardware independence for future use of 3D Whole Body Scanning technologies.

5 Results Achieved, Lessons Learned & Benefits

This section summarizes the results and benefits achieved at the end of this Short Term project at the Ft. Jackson CIIP, MCRD-SD, and MCRD-PI.

5.1 Summary of Results Achieved & Lessons Learned

The research efforts conducted during this STP included several linked activities and objectives with respect to the installation and integration of 3D Whole Body Scanning. This included the VITUS/Smart Body Scanner and the development of Automatic Size Prediction for Phase II Male Army Dress Uniform Items at Ft. Jackson and the related evaluation of the use of the Cyberware WBX in use at the MCRDs for comparable efforts for the US Marine Corps.

These changes and enhancements have contributed to ensuring that recruit issues are accurately recorded without adversely affecting the CIIP's/RTC's performance standards during recruit issues, DSCP Item Managers have better production requirement data, and wholesale-local inventory requirement predictions are more accurate with reduced inventory levels required. Following completion of this project, support has been extended and refinements continue to be made to fine-tune operational support and efficiency of the supply chain activities.

5.1.1 3D Whole Body Scanning Results at Ft. Jackson

At Fort Jackson, the project provided for completion of the following activities that enabled the ARN Project Team members to achieve the objectives defined at the beginning of the STP.

5.1.1.1 Scanner Installation & ARN-IRM System Integration at Ft. Jackson

The project team worked with personnel at Ft. Jackson to modify the Clothing Initial Issue Point operations with the incorporation of the 3D Whole Body scanner and the integration to the ARN-IRM systems. Key elements of this activity are summarized in the following bullets:

- Installed the Human Solutions VITUS/Smart hardware and software at Ft. Jackson taking into account special requirements of the existing issuing line and available floor space. The developed operational concept and process particularly takes into account that female recruits can be integrated at a later step into the Phase II recruit flow for female recruits.
- Linked Human Solutions VITUS/Smart 3D Whole Body scanning capabilities to ARN Integrated Retail Module (ARN-IRM) information systems for recruit information data captured by local personnel, including linking data collection to ARN systems using Autodata scan forms and CabinetNG software to capture issues at Ft. Jackson. On base of that, recommendations to integrate automatic uniform sizing results into existing ARN SCM solutions have been developed.

- Implemented and set-up an ARN Local Area Network (LAN) providing interfaces for integration and linking of Human Solutions VITUS/Smart technologies into operational processes at Ft. Jackson and into ARN IRM Supply Chain Management (SCM) systems (outside the fire wall of Ft. Jackson existing 'legacy' systems).
- Developed and integrated the Merlin System as the interface software between ScanWorX and ARN-IRM for passing recruit information to ScanWorX, and receiving the measurement extraction and size prediction information into ARN-IRM.

5.1.1.2 Results of Automatic Size Prediction at Ft. Jackson

The project team worked with CIIP personnel at Ft. Jackson to establish accurate and consistent body measurements by use of VITUS/Smart body scanning technologies. The following bullets provide highlights of the results achieved with the use of the automatic size prediction capabilities using the 3D Whole Body Scanning hardware and software applications:

- This has been approved by a manual measurement survey performed by an experienced tailor during the beginning phase of the project. The results showed, that the manual body measurements compared to scan measurements were in acceptable tolerances for automatic size prediction.
- Conducted research to develop and establish correct and accurate uniform size selection for use by the U. S. Army and military departments. The initial integration of size prediction rules extracted on base of available Technical Specifications for the selected Phase II male dress uniform items and the Army TM 10-227 Fit Manual (Army Technical Manual for Fitting Uniforms) turned out not to be sufficient sources of information for accurate uniform size selection.
- The size selection rules have been developed and refined by additionally collecting and analyzing issued size data and successively optimizing the size prediction rules according to this collected empirical information.
- The size prediction has been validated and optimized for 3D Army male dress uniform items. Although the dress uniform trousers still show lower fitting rates (61% for +/-1 size) an average fitting rate of approx. 80% for nearly all items could be achieved. The goal to reach 95% fitting rate with respect to the +/-2 size metrics was successfully accomplished.

5.1.2 3D Whole Body Scanning Results at MCRD-PI & MCRD-SD

While the 3D Whole Body Scanner capabilities had previously been installed at both of the USMC Recruit Training Centers, the support during this project included the replacement of the prototype scanner at MCRD-SD with the WBX Scanner. This equipment upgrade also included upgrades to the facilities at MCRD-SD. Additional

work was also completed related to the development and testing of the Merlin Software capabilities for automatic size prediction as well as integration of this software into the ARN-IRM capabilities. Specifically, the project team completed the following activities related to automatic size prediction at MCRD-PI and MCRD-SD:

- Conducted research on measurement rules and integration of, Uniform Size Tables and Size Selection Rules at USMC Recruit training Depots – Parris Island and San Diego.
- An experienced tailor conducted A manual measurement validation at MCRDI-PI with the manual measurements compared with the measurements extracted by the WBX scanner. The WBX scanner at MCRD-PI showed comparable results with respect to the manual measurements, as did the results achieved with the Vitus/SMART 3D whole body scanner installation at Ft. Jackson.
- Conducted research on the integration of already existing dress item Size Tables and Size Selection Rules previously developed and formulated by ARN research activities for Male Marine Dress Uniform items.
- Conduct baseline and subsequent research to determine the improvement in speed and accuracy of the recruit issue capture process for male dress uniform items using the 3D Whole Body scanning technologies and the related ARN systems for recruit identification and item issuing.

At the various sites where the scanners have been installed, some procedures have changed in order to capture the sizes via the scanner. Also, the actual data captured was used to update sizing data tables in order to increase the accuracy rate of the scanner. With the development of the Merlin software application and capabilities, sizing data tables and results achieved can continue to be refined in the future exclusive of reliance on proprietary hardware and associated software from different manufacturers.

5.1.2.1 Results of Automatic Size Prediction at MCRD-SD & MCRD-PI

The following items highlight the key lessons learned during insertion of WBX 3D Whole Body Scanner at MCRD-SD into the normal flow of the RTC, and its integration to VIM-IRM to establish a fully automated supply chain management solution. Additionally, there were lessons learned during evaluation of the scanning results at both MCRD-SD and MCRD-PI:

- Cyberware scans of MCRD-SD and MCRD-PI can be transformed into a format that can be read and processed by Human Solutions ScanWorX body measurement extraction software,
- The process is time consuming since the systems use different coordinate systems to represent the scans and thus the scans have to be rotated before they can be processed. This process would require automation which can be achieved by minor software modifications,

- Body measurement extraction from Cyberware and Human Solutions shows comparable results, for some body dimensions a systematic deviation is observed which can be compensated by a linear transformation

The size prediction accuracy for Cyberware scans with Human Solutions size prediction software and vice versa was not tested during this STP. This activity might be considered for additional research in the future.

5.2 Summary of Benefits Achieved with Use & Integration of 3D Scanning

The overall concept, applications and integrated systems approach incorporating VIM/Wholesale Local, electronic forms management, use of hand-held terminals and the 3D Whole Body Scanner was well received and accepted by the personnel at the Ft. Jackson CIIP, and the Recruit Training Centers at MCRD-PI and MCRD-SD. The following bullets provide highlights of summary benefits achieved.

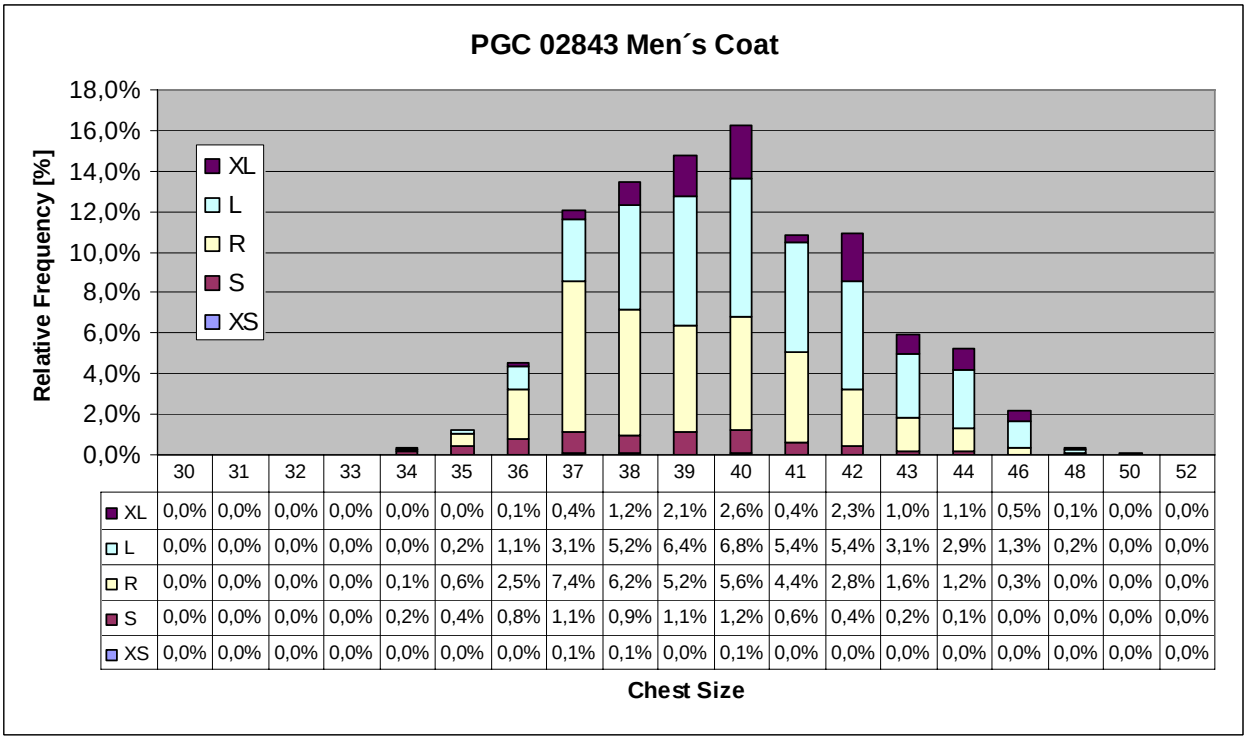
- **Improved Effectiveness of Phase II Male Issue Process –**
  - The Phase II male issue process incorporates the use of the 3D Whole Body Scanner for nearly 100% of recruits.
  - The routine uniform issue and accounting procedures have changed to accomplish automated capture of the predicted sizes via the 3D scanner, to completely integrate this information via Merlin into ARN-IRM and to ensure all issues were properly accounted for and reported.
  - Reduction of the scan-to-scan time from originally processing required approximately 2 minutes and this was reduced to approximately 45 seconds by splitting the scanning and data processing to separate computers.
  - Reduction of issue form processing time was accomplished by integrating automatic form scanning with Cabinet NG (electronic document management capabilities) and automatic transfer of issue data to ARN-IRM.
  - Increased accuracy of size predication processing contributed to higher recruit and personnel satisfaction and reduced the volume of returns.
  - Improved accuracy and timeliness of inventory management data through the use of ARN-IRM capabilities reduced the number of item stock-outs and investment in inventory at both local and wholesale areas (these results are documented in reports from other Apparel Research Network projects (see http://arn2.com).
- **Up-to-date Scan and Size Data Base for size table refinements**

- The project generated an up-to-date database with scans and sizes of the Phase II Male dress uniform issue items for more than 24,000 recruits.
- This is one of the largest scan databases available today worldwide.
- This data can be used mid-term to update the sizing systems, adapt the number of available sizes and optimize the patterns of the items to increase the fit and thus to increase the size prediction accuracy.

➢ **Up-to-date Tariffs for Male US Army dress uniform items -**

- Updated tariffs for the Phase II male dress uniform items have been calculated and updated on basis of the electronically recorded issued sizes of more than 24,000 recruits.
- The updated tariffs provide the necessary information to optimize availability of male dress uniform items to improve speed and accuracy of issuing processes by use of the 3D Whole Body scanning technologies.

The following diagram shows an example of the calculated tariff for the Dress Uniform Coat. Comparable information and tariffs can be generated using the stored data for other military uniform items. The tariff diagrams have been evaluated for each of the items integrated in the research conducted within this STP and are attached to the report in Annex H.



	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	46	48	50	52
XL	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,4%	1,2%	2,1%	2,6%	0,4%	2,3%	1,0%	1,1%	0,5%	0,1%	0,0%	0,0%
L	0,0%	0,0%	0,0%	0,0%	0,0%	0,2%	1,1%	3,1%	5,2%	6,4%	6,8%	5,4%	5,4%	3,1%	2,9%	1,3%	0,2%	0,0%	0,0%
R	0,0%	0,0%	0,0%	0,0%	0,1%	0,6%	2,5%	7,4%	6,2%	5,2%	5,6%	4,4%	2,8%	1,6%	1,2%	0,3%	0,0%	0,0%	0,0%
S	0,0%	0,0%	0,0%	0,0%	0,2%	0,4%	0,8%	1,1%	0,9%	1,1%	1,2%	0,6%	0,4%	0,2%	0,1%	0,0%	0,0%	0,0%	0,0%
XS	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%

Figure 48: Tariff Diagram for Men´s Dress Uniform Coat

Further analysis of the Men´s Coat showed that although in total 71 different sizes are available, only a portion of the sizes are really issued to the recruits. This is a key finding and has significant implications for future refinement of uniform tariffs.

Based on the results of the research, to fit 90% of the recruits, only 27 sizes, i.e. 38% of the available sizes are needed, to fit 95% of the recruits, only 35, i.e. 50%, of the available sizes are needed, to fit 98% of the recruits 53 sizes, i.e. 75%, of the available sizes are needed.

This is illustrated in the following figure: the sizes marked green represent the 90%, the yellow marked sizes are added for the 95% and the red marked sizes are added for the 98% portion of recruits.

COAT AG 489

%		COAT AG 489 - Length						Total
			XS	S	R	L	XL	
COAT AG 489 - Chest	n.a.	1.7%						1.7%
	30				0.0%			0.0%
	31				0.0%			0.0%
	32				0.0%			0.0%
	33			0.0%	0.0%	0.0%		0.0%
	34		0.0%	0.2%	0.1%	0.0%		0.3%
	35		0.0%	0.4%	0.6%	0.2%	0.0%	1.3%
	36		0.0%	0.8%	2.5%	1.1%	0.1%	4.5%
	37		0.1%	1.1%	7.4%	3.1%	0.4%	12.0%
	38		0.1%	0.9%	6.2%	5.2%	1.2%	13.5%
	39		0.0%	1.1%	5.2%	6.4%	2.1%	14.8%
	40		0.1%	1.2%	5.6%	6.8%	2.6%	16.2%
	41		0.0%	0.6%	4.4%	5.4%	0.4%	10.8%
	42		0.0%	0.4%	2.8%	5.4%	2.3%	10.9%
	43			0.2%	1.6%	3.1%	1.0%	6.0%
	44			0.1%	1.2%	2.9%	1.1%	5.2%
	46			0.0%	0.3%	1.3%	0.5%	2.2%
	48				0.0%	0.2%	0.1%	0.3%
	50					0.0%	0.0%	0.1%
	52						0.004%	0.0%
Total		**1.7%**	**0.3%**	**7.0%**	**38.1%**	**41.1%**	**11.7%**	**100.0%**

Figure 49: Tariff Distribution for Men´s Dress Uniform Coat

The results of the analysis for all items integrated within the STP are summarized in the following chart. For each item, the corresponding portion of recruits is drawn over the number of sizes.

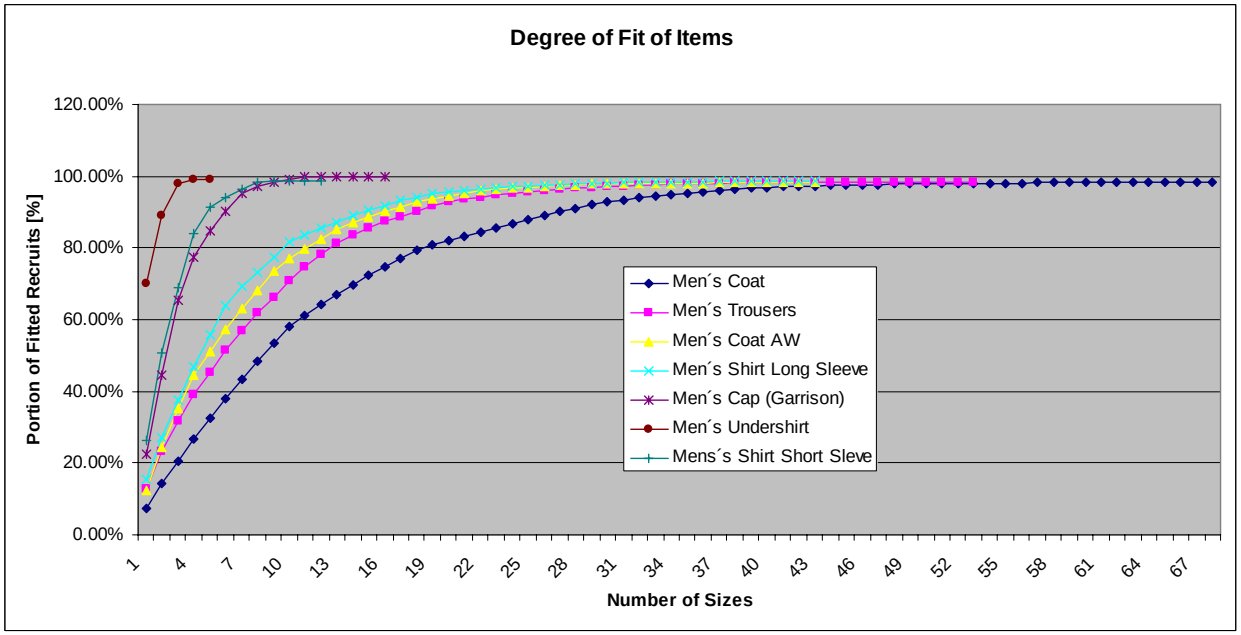


Figure 50: Degree of Fit of Items

Item	No. Avail. Sizes	Number of Sizes to fit given percentage of recruits				
		80%	90%	95%	97%	98%
Men´s Coat	71	19	27	35	41	53
Men´s Trousers	55	13	18	24	30	36
Men´s Coat All Weather	45	12	16	21	26	32
Men´s Shirt Long Sleeve	37	10	15	19	24	30
Mens´s Shirt Short Sleve	12	4	5	7	8	8
Men´s Undershirt	8	2	3	3	3	4
Men´s Cap (Garrison)	13	5	6	7	8	9
		Percentage of Sizes				
Men´s Coat		27%	38%	49%	58%	75%
Men´s Trousers		24%	33%	44%	55%	65%
Men´s Coat All Weather		27%	36%	47%	58%	71%
Men´s Shirt Long Sleeve		27%	41%	51%	65%	81%
Mens´s Shirt Short Sleve		33%	42%	58%	67%	67%
Men´s Undershirt		25%	38%	38%	38%	50%
Men´s Cap (Garrison)		38%	46%	54%	62%	69%

Figure 51: Number of Sizes to fit given percentage of recruits

The above tables define a basis for the optimization of the sizing systems by eliminating “inefficient” sizes, which are no longer needed, since the recruit population has changed over the past decades and open further potential to further decrease stock volumes.

In summary, the results achieved from the objectives defined at the start of this project including the following:

- Improved effectiveness of Phase II Uniform Male Issue Process with accurate recruit identification and faster forms processing.
- Developed use of 3D Body Scanning technologies for issue processing including capturing data for updating/refinement of sizing data tables.
- The Phase II male issue process successfully incorporated the use of the VITUS/Smart 3D Whole Body Scanner for nearly 100% of the recruits at Ft. Jackson and MCRD-PI. While the capabilities have been provided at MCRD-SD, personnel follow different training schedules at this RTC and have not yet made changes to accomplish scanning of all recruits at this location.
- The data captured is now available to be used to update sizing data tables, and to increase accuracy by using the scanner in the future – both at the Ft. Jackson CIIP and future sites.

APPENDICES

Note: Additional references and ARN Supply Chain Management Technical Reports are available from the ARNII website at http://arn2.com.

Appendix A – Definition of Terms & Acronyms

The following acronyms are used in this report and are provided to provide clarity of understanding for the reader.

- **ARN** – Apparel Research Network made up of selected industry and academic partners working together to develop innovative solutions for the Apparel industries support of military departments.
- **ASTRA** - ARN Supply-chain Transaction Repository Audit.
- **C&T** – Clothing and Textiles Division of the Defense Supply Center Philadelphia.
- **DOS** – Day Of Supply.
- **DSCP – Defense Supply Center Philadelphia -** DSCP controls the procurement and distribution of Medical, Subsistence (i.e., food), and Clothing and Textiles commodities to Defense Logistics Agency (DLA) depots and stock record accounts, worldwide.
- **ESOC – Emergency Supply Operations Center –** This refers to orders that are processed through the Emergency Supply Operations Center at DSCP. ESOC orders processed for different sites are now handled via contractor support as part of regular maintenance support for customers using the ARN VIM/Wholesale Local systems.
- **HHT –** Hand-Held Terminal
- **MCRD-PI** – Marine Corps Recruit Depot – Parris Island
- **MILSTRIP** – Military Standard Replenishment System
- **NSN** – National Stock Number
- **OL** – Operating Level
- **OST** – Order Ship Time
- **QDR** – Quality Deficiency Report. These are used to track items that are outside acceptable standards for issue to recruits. These reports provide for communication with DSCP Item Managers regarding problems of quality that are encountered.
- **QLM** – Quality Logistics Management™ – Material Management inventory system supporting acquisition, issues and distribution and predictive forecasting.
- **QLM/Local** – The QLM software implemented as a “wholesale local” inventory management system supporting acquisition, distribution and predictive forecasting at Ft. Leonard Wood as a prototype for future sites. The system provides a “local” capability to manage wholesale inventory

assets located at the CIIP including receipt and inventory adjustment processing.

- **RIC** – Routing Identifier Code – Refers to a code used in SAMMS for identification of location where materials are to be shipped.
- **RTC** – Recruit Training Center (includes Army CIIPs) – These are the facilities operated by the different departments of the military where new recruits are inducted for basic training.
- **SAMMS** – Standard Accounting and Material Management System - This system is used by the Defense Logistics Agency, Defense Procurement Support Center.
- **SSN** – Social Security Number – nine (9) digit number to identify a recruit
- **SWX –** Human Solutions' scan, body measurement extraction and and size prediction software ScanWorX
- **System Change Requests (SCRs) –** SCRs refer to the process and procedures that are used to track requested revisions to systems software as enhancements are requested or operational "software bugs" are identified during testing or use in production. These are tracked and managed through a system used to record: System Change Request title/description; detail/describe changes requested; points-of-contact; authority for approval/denial of SCR; programming assignments; and tracking of disposition resulting (acceptance/rejection) of requested change(s) to program(s).
- **VB –** Visual Basic
- **VIM –** The Virtual Item Manager (VIM) system incorporates operational data extracted from the SAMMS Clothing & Textile (C&T) server as the basis for the operational and decision support capabilities provided in a single source of information for Item Managers at the retail (Recruit Training Centers) and wholesale (DSCP) level.
- **VIM/WL –** VIM Wholesale Local

Appendix B – Project Personnel

The following personnel were involved in various phases or tasks for this project. Each of these individuals played key roles and worked closely together in achieving the desired results from the integration of the 3D Whole Body Scanners to ARN VIM – IRM system and evaluation of the results. The Project Team members are grateful for the contribution and support of the personnel at Fort Jackson, South Carolina who contributed their support to this research effort.

Martin Apel – Human Solutions GmbH, Germany

Jochen Balzulat – Human Solutions of North America, Inc.

Robert E. Bona – AdvanTech Systems Design Engineer

Ulrich Botzenhardt – Human Solutions GmbH, Germany

Dennis Brekhus – AdvanTech Assistant Project Manager

Doug DeLoach - Advantech

Helga Gäbel – Human Solutions GmbH, Germany

Helmut Hamfeld – Human Solutions GmbH, Germany

Guido Hansen – Human Solutions GmbH, Germany

Bernie Johns – ARN Project Support

Frankie M. Mason – AdvanTech Network Systems Administrator

Robert J. Padilla – Advantech Senior Trainer

Richard A. Perrin – AdvanTech Project Manager

Anke Rissiek – Human Solutions GmbH, Germany

Jochen Schneider – Human Solutions GmbH, Germany

Essie Smith – Ft. Jackson CIIP Supervisor

Michael Stöhr – Human Solutions GmbH, Germany

Rainer Trieb – Human Solutions GmbH, Germany

Julie Tsao – ARN Project Manager, DLA

Roy Wang – Human Solutions of North America, Inc.

Debra Wassel – AdvanTech Technical Support

Appendix C – ARN IRM Control Panel

This Appendix provides an overview of the ARN Control Panel by illustrating several of the screen used for processing clothing issues to recruits.

The system was originally developed as part of the enhanced IRM solution and has since had several enhancements added as a result of user input received from various locations including the Army CIIPs, and Lackland Air Force Base AFCIIF.

In the following material, each screen illustrated is followed by a brief description to assist the viewer in understanding the purpose and use of the screen to display information for processing issues to recruits.

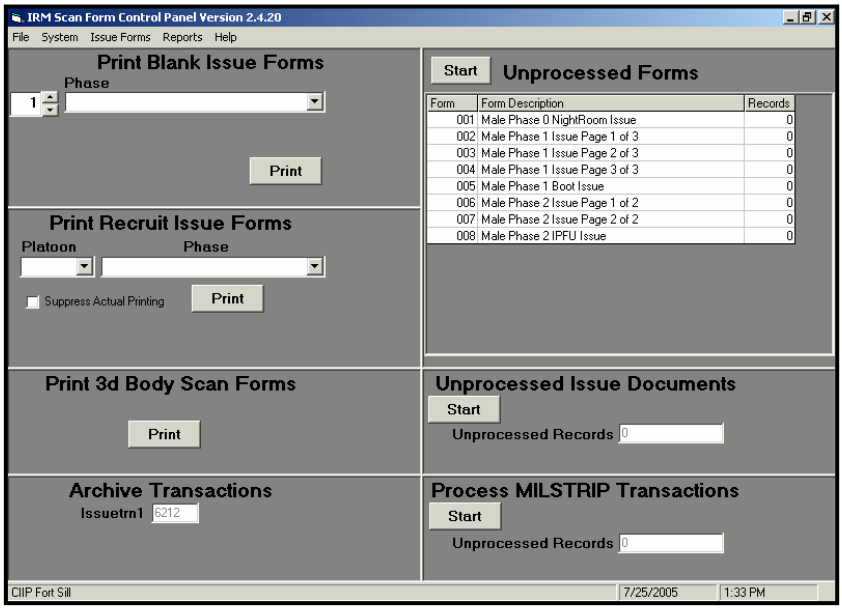


Figure 52: Main Window of the IRM Control Panel

This is the main window of the IRM Control Panel. From this window, RTC personnel process forms, create MILSTRIP transactions and send MILSTRIP transactions.

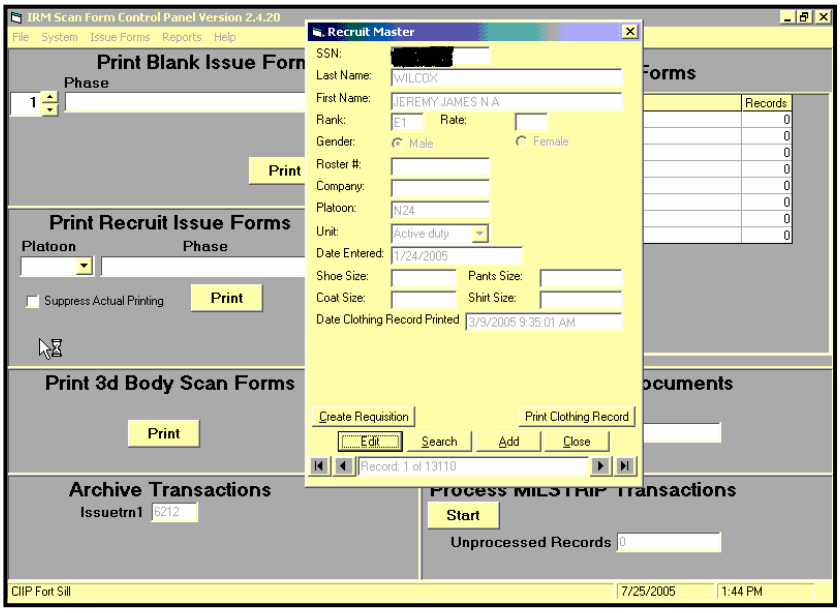


Figure 53: IRM Control Panel Recruit Master Window

The Recruit Master window is used to build new recruit records, modify existing records, and print or re-print issue forms.

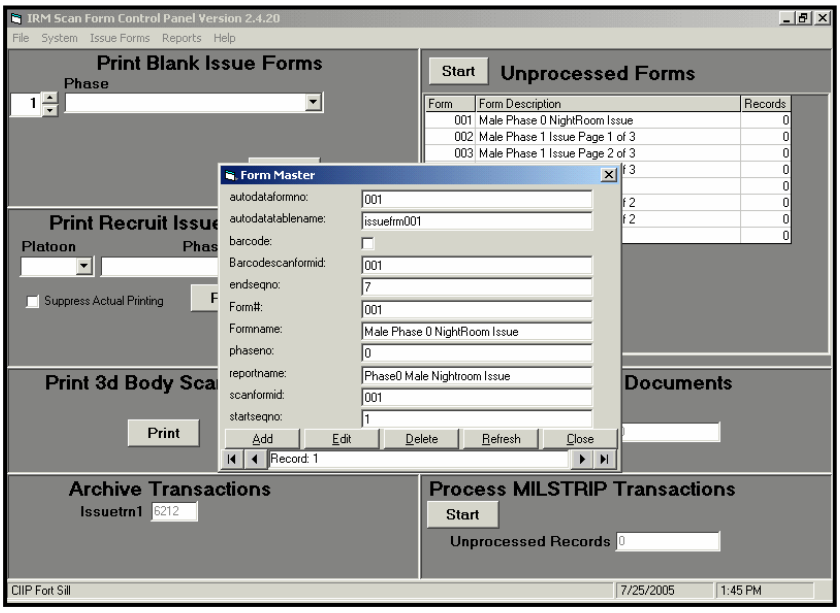


Figure 54: IRM Control Panel Form Master Window

The Form Master window provides the interface that is used to add or modify issue form data.

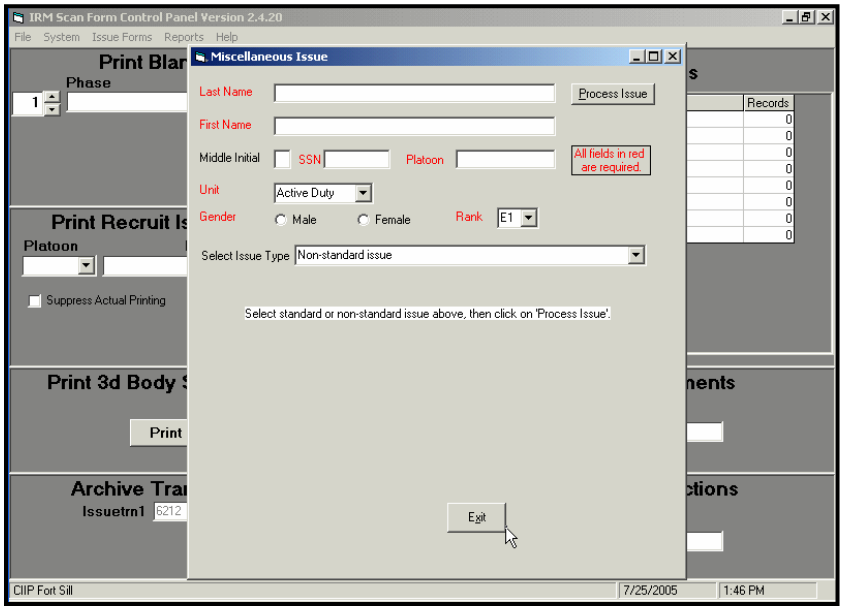


Figure 55: IRM Control Panel Form Miscellaneous Issue Window

The Miscellaneous Issue window allows users to capture issues made to non-recruits, i.e. Drill Sergeants.

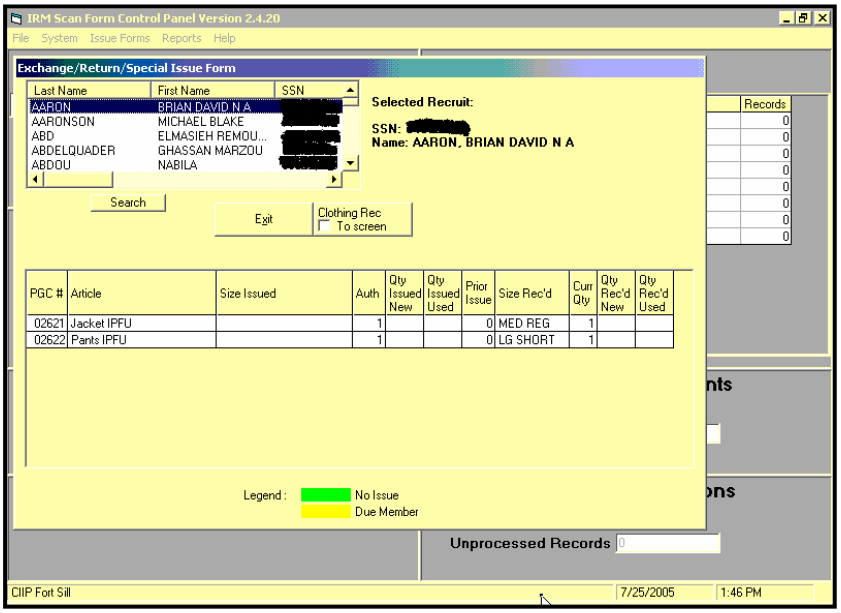
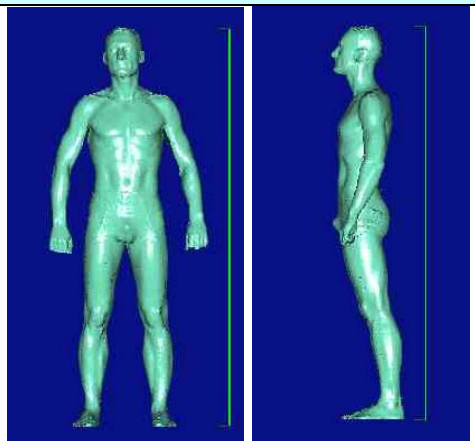
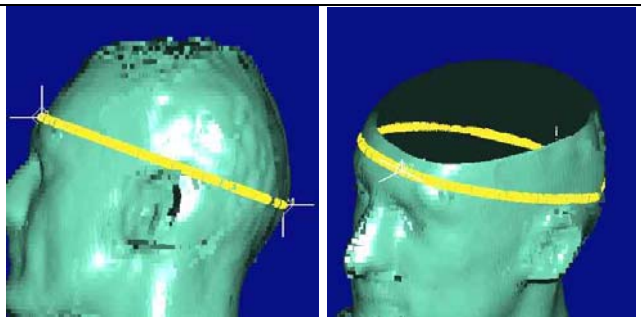
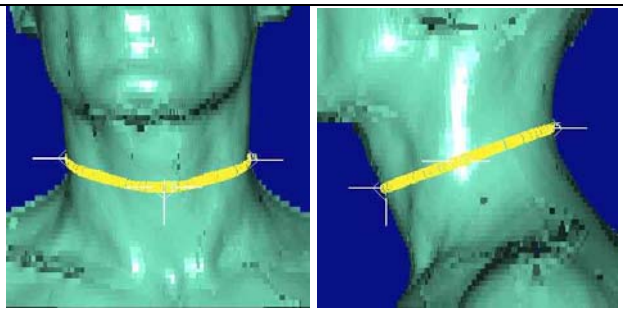
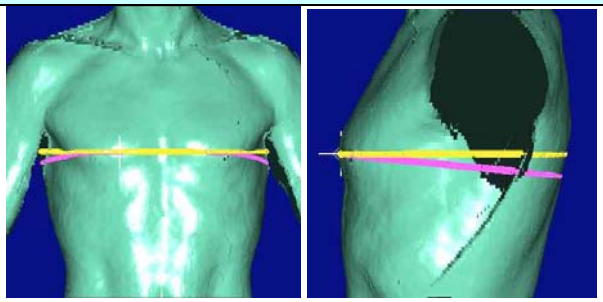
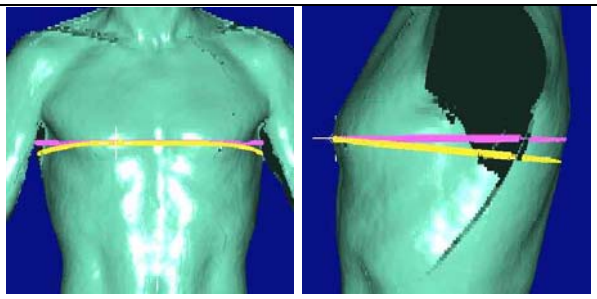
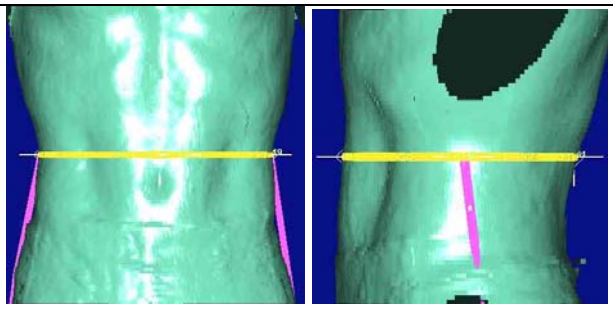
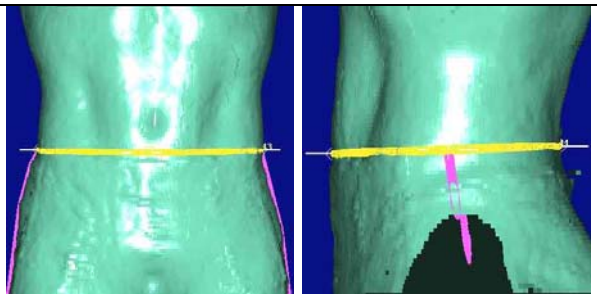


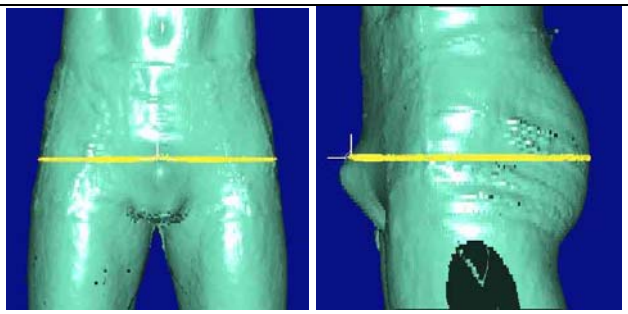
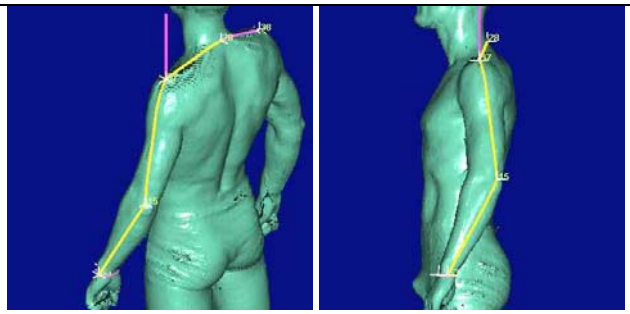
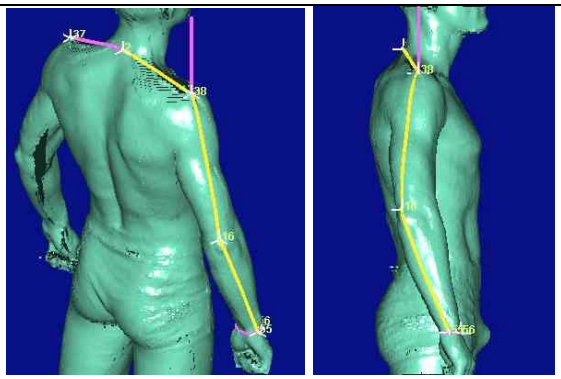
Figure 56: IRM Control Panel Exchange Return Special Issue Form Window

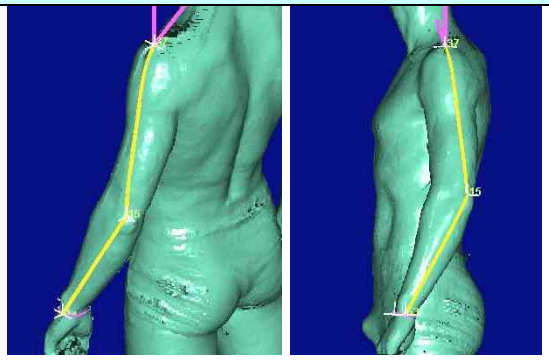
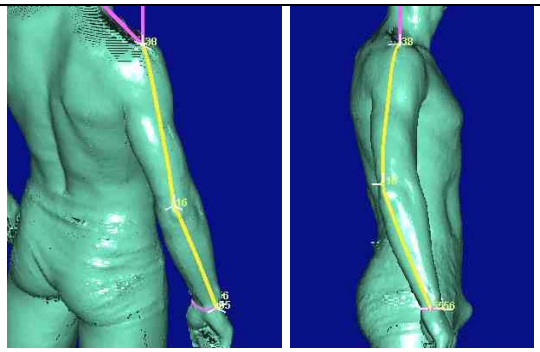
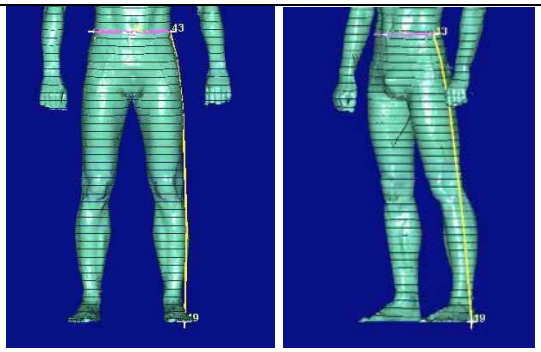
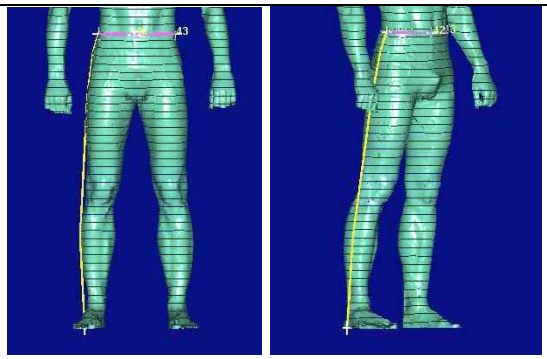
The Exchange/Return/Special Issue form is used to capture any changes to items issued to recruits.

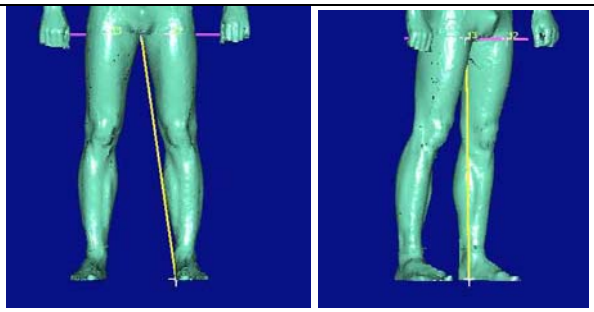
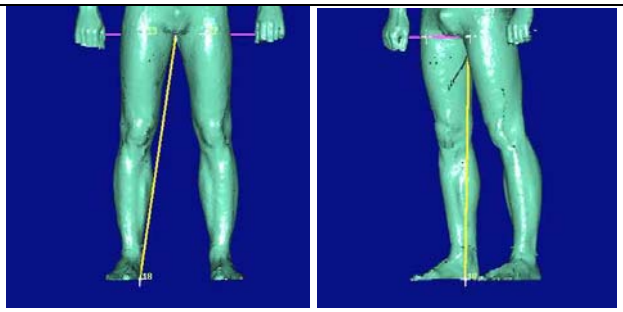
Appendix D – Body Dimensions used for Size Selection

Name	SWX-ID	Illustration	Description
Body Height	0010		Maximum vertical height from standing surface to the top of the head. The vertical distance is measured between the standing surface and the top of the head. The subject feet are placed in footprints adhered to the standing surface.
Head Girth	1530		Maximum circumference around the top of the head. The maximum circumference of the head is measured perpendicular to its long axis of the head in a front-to-back plane with the tape passing just above the bony brow ridges and across the most protruding point of the back of the head.
Mid Neck Girth	1510		Maximum circumference around the middle of the neck. The maximum circumference of the neck is measured perpendicular to its long axis of the neck in a front-to-back plane with the tape passing through the height of the Adams apple.

Name	SWX-ID	Illustration	Description
Chest Girth (horizontal)	4510		The circumference of the chest is measured across the bust point landmarks. The circumference is measured **parallel** to the standing surface. The measurement is taken at the point of quiet breathing.
Chest Girth	4515		The circumference of the chest is measured across the bust point landmarks. The circumference is measured **perpendicular to the axis of the torso**. The measurement is taken at the point of quiet breathing.
Waist Girth	6510		The circumference of the waist is measured in the height of the natural waist. The natural waist height is determined by the height resulting in a minimum circumference. The circumference is measured **parallel** to the standing surface. The measurement is taken at the point of quiet breathing.
Waist Band Girth	6520		The circumference of the spatial run of the waistband is measured, and thus resulting in a better measurement for the waist width of the trouser compared to the waist circumference. The male waistband typically is lower than the waist height, since male trousers have a lower

Name	SWX-ID	Illustration	Description
			rise than female trousers. Further the run of the waistband line is not parallel to the standing surface
Bottom Girth	7520		The maximum circumference of the bottom is measured in a front-to-back plane with the tape passing just above the across the most protruding point of the buttock. The circumference is measured **parallel** to the standing surface.
Arm length to neck back left	8010		The distance is measured from cervicale left (7. CV), over the top of the left acromion point, then along the outside of the arm to the left wrist landmark. The subject stands with the arm slightly bended and the hand placed one hand width apart from the hip.
Arm length to neck back right	8011		The distance is measured from cervicale right (7. CV), over the top of the right acromion point, then along the outside of the arm to the right wrist landmark. The subject stands with the arm slightly bended and the hand placed one hand width apart from the hip.

Name	SWX-ID	Illustration	Description
Arm length left	8030		The distance is measured from the top of the right acromion point, then along the outside of the arm to the right wrist landmark. The subject stands with the arm slightly bended and the hand placed one hand width apart from the hip.
Arm length right	8031		The distance is measured from the top of the right acromion point, then along the outside of the arm to the right wrist landmark. The subject stands with the arm slightly bended and the hand placed one hand width apart from the hip.
Side Length left	9030		The length of a measurement band is measured from the outer side of the left foot on the standing surface to the most left point of the waistband measurement. The subject's feet are placed in footprints adhered to the standing surface
Side Length right	9031		The length of a measurement band is measured from the outer side of the right foot on the standing surface to the most right point of the waistband measurement. The subject's feet are

Name	SWX-ID	Illustration	Description
			placed in footprints adhered to the standing surface
Inseam left	9020		The distance is measured from the inner side of the left foot on the standing surface to the lowest point of the crotch. The subject's feet are placed in footprints adhered to the standing surface
Inseam right	9091		The distance is measured from the inner side of the right foot on the standing surface to the lowest point of the crotch. The subject's feet are placed in footprints adhered to the standing surface

Appendix E – Final Size Prediction Configuration

Appendix E provides the complete final size selection configuration developed during the progress of the project for the selected items issued at Ft. Jackson. The size selection configuration is a structured ASCII file, which is read by the Human Solutions Size Prediction Software after it is started in order initialize the size selection algorithms.

The structure of the size prediction configuration file is shown in the following figure. The file is separated in different sections providing the definition of the sizes and the definition of the size prediction parameters.

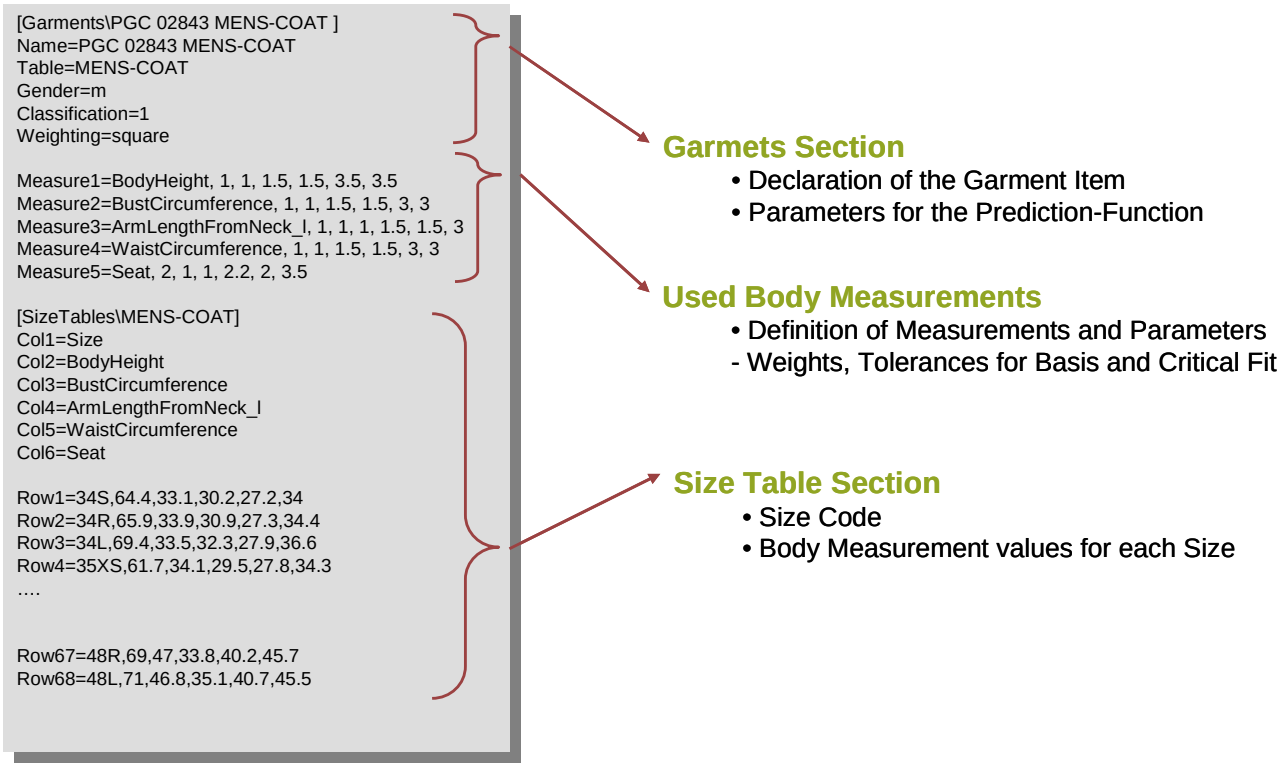


Figure 57: Structure of the size prediction configuration file

On the following pages the Ft. Jackson size prediction file is completely listed.

```
; US Army Fort JACKSON
; Date 2005, February 28
; Mens Garments

[Garments\PGC 02843 MENS-COAT]
Name=PGC 02843 MENS-COAT
Table=MENS-COAT
Gender=m
Classification=1
Weighting=square

Measure1=BodyHeight, 1, 1, 1.5, 1.5, 3.5, 3.5
Measure2=BustCircumference, 1, 1, 1.5, 1.5, 3, 3
Measure3=ArmLengthFromNeck_l, 1, 1, 1, 1.5, 1.5, 3
Measure4=WaistCircumference, 1, 1, 1.5, 1.5, 3, 3
Measure5=Seat, 2, 1, 1, 2.2, 2, 3.5

[SizeTables\MENS-COAT]
Col1=Size
Col2=BodyHeight
Col3=BustCircumference
Col4=ArmLengthFromNeck_l
Col5=WaistCircumference
Col6=Seat

Row1=34S,64.4,33.1,30.2,27.2,34
Row2=34R,65.9,33.9,30.9,27.3,34.4
Row3=34L,69.4,33.5,32.3,27.9,36.6
Row4=35XS,61.7,34.1,29.5,27.8,34.3
Row5=35S,64.4,33.9,30.5,27.8,34.9
Row6=35R,66.7,34,31.4,27.9,35.2
Row7=35L,69.7,33.6,32.6,27.7,35.8
Row8=36XS,61.1,34.4,29.4,29.1,35.1
Row9=36S,64.2,35.2,30.5,28.9,35.8
Row10=36R,67,35.1,31.6,28.9,36.3
Row11=36L,69.7,34.7,32.6,28.6,36.3
Row12=36XL,71.2,34.8,33,28.5,36.1
Row13=36XL,71.2,34.8,33,28.5,36.1
Row14=37XS,61.7,36.3,29.4,30.7,36.5
Row15=37S,64.3,36.3,30.8,30.1,36.7
Row16=37R,67,36.2,31.8,29.8,37
Row17=37L,69.8,35.8,32.8,29.6,37.1
Row18=37XL,72.9,35.3,33.8,29.5,37.4
Row19=37XL,72.9,35.3,33.8,29.5,37.4
Row20=38XS,62.5,36.4,30.2,30,36.7
Row21=38S,64.5,37.2,30.9,30.8,37.3
Row22=38R,67.2,37.3,32.1,30.7,37.7
```

```
Row23=38L,69.9,36.9,33.1,30.5,38
Row24=38XL,72.7,36.5,34.2,30.1,37.8
Row25=38XL,72.7,36.5,34.2,30.1,37.8
Row26=39XS,61.9,37.7,29.6,31.4,37.3
Row27=39S,64.4,37.9,31,31.4,38
Row28=39R,67.2,38.4,32.2,31.8,38.8
Row29=39L,69.9,37.9,33.3,31.4,38.8
Row30=39XL,73,37.8,34.7,31,39
Row31=39XL,73,37.8,34.7,31,39
Row32=40XS,61.6,38.7,30.2,32.9,39.2
Row33=40S,64.6,39.2,31.2,32.8,39.1
Row34=40R,67.3,39.3,32.3,32.9,39.7
Row35=40L,70.2,38.9,33.5,32.3,39.8
Row36=40XL,73.3,39,34.9,32.4,40.2
Row37=40XL,73.3,39,34.9,32.4,40.2
Row38=41S,64.9,40.6,31.4,34,40.1
Row39=41R,67.5,40.3,32.5,34,40.7
Row40=41L,70.1,40,33.6,33.5,40.7
Row41=41XL,73.1,40,34.4,33.2,40.8
Row42=41XL,73.1,40,34.4,33.2,40.8
Row43=42XS,63.3,41.2,30.9,34.8,40.1
Row44=42S,64.9,40.7,31.7,34.7,40.5
Row45=42R,67.4,41.4,32.7,35.1,41.3
Row46=42L,70.3,41,33.8,34.6,41.5
Row47=42XL,73.3,40.6,35.2,34.2,41.7
Row48=42XL,73.3,40.6,35.2,34.2,41.7
Row49=43S,64.9,42.6,31.6,35.9,41.8
Row50=43R,67.7,42.3,32.7,36.1,42.1
Row51=43L,70.3,42.2,33.9,36,42.6
Row52=43XL,73.6,42.2,35.3,35.6,43.2
Row53=43XL,73.6,42.2,35.3,35.6,43.2
Row54=44S,65.4,43.5,32.5,37.2,42.4
Row55=44R,67.6,43.4,33.1,37.2,42.7
Row56=44L,70.4,43.4,34.1,37.1,43.3
Row57=44XL,73.8,43.3,35.7,36.8,44
Row58=44XL,73.8,43.3,35.7,36.8,44
Row59=46R,68.3,45.5,33.6,38.9,43.9
Row60=46L,70.7,45.1,34.5,38.7,44.4
Row61=46XL,73.9,45.8,35.8,38.8,45.3
Row62=46XL,73.9,45.8,35.8,38.8,45.3
Row63=46R,68.3,45.5,33.6,38.9,43.9
Row64=46L,70.7,45.1,34.5,38.7,44.4
Row65=46XL,73.9,45.8,35.8,38.8,45.3
Row66=46XL,73.9,45.8,35.8,38.8,45.3
Row67=48R,69,47,33.8,40.2,45.7
Row68=48L,71,46.8,35.1,40.7,45.5
Row69=48R,69,47,33.8,40.2,45.7
Row70=48L,71,46.8,35.1,40.7,45.5
```

```
[Garments\PGC 02195 MENS-TROUSERS]
Name=PGC 02195 MENS-TROUSERS
Table=MENS-TROUSERS
Gender=m
Classification=1
Weighting=square

Measure1=WaistBand, 1, 1, 1.5, 1.5, 3, 3
Measure2=Seat, 5, 1, 1, 2, 2.5, 4
Measure3=Inseam, 1, 1, 2, 2, 3.5, 3.5
Measure4=SideLength_l, 0, 0, 100, 100, 100, 100
Measure5=WaistCircumference, 1, 1, 1.6, 1.6, 3.5, 3.5

[SizeTables\MENS-TROUSERS]
Col1=Size
Col2=WaistBand
Col3=Seat
Col4=Inseam
Col5=SideLength_l
Col6=WaistCircumference

Row1=28S,27.1,33.8,28.6,40.6,26.8
Row2=28R,29.1,34,26.8,39.8,27.3
Row3=28L,27.6,34,30.3,43.2,26.1
Row4=29S,27.9,34.2,28.8,41,27.5
Row5=29R,28.6,34.3,28.8,41.2,27.7
Row6=29L,28.6,35.1,31,43.5,27.2
Row7=29XL,28.8,34.7,31.8,44.7,27.3
Row8=29XL,28.8,34.7,31.8,44.7,27.3
Row9=30S,29.1,35,27.9,40.1,28.9
Row10=30R,28.9,35.5,28.8,41.2,28.3
Row11=30L,29.5,35.6,30.8,43.3,28.5
Row12=30XL,30.1,36.1,32.6,45.4,28.7
Row13=30XL,30.1,36.1,32.6,45.4,28.7
Row14=31S,30.1,36.1,27.3,39.4,29.9
Row15=31R,29.8,36.3,28.9,41.3,29.4
Row16=31L,30.3,36.5,30.7,43.4,29.2
Row17=32S,30.5,36.7,27.7,39.9,30.7
Row18=32R,30.8,37.4,28.8,41.3,30.4
Row19=32L,31,37.4,30.5,43.3,30.2
Row20=32XL,31.3,37.6,32,44.9,30.1
Row21=32XL,31.3,37.6,32,44.9,30.1
Row22=33S,31.2,37.4,28.4,41.2,31.5
Row23=33R,31.7,38,29,41.5,31.5
Row24=33L,31.7,38.3,30.3,42.9,31.3
Row25=33XL,32,38.5,31.9,45,31
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Row26=33XL,32,38.5,31.9,45,31
Row27=34R,32.8,38.9,28.7,41.4,32.6
Row28=34L,32.8,39.3,30.3,43.1,32.3
Row29=34XL,33.1,39.6,31.7,44.8,32.1
Row30=34XL,33.1,39.6,31.7,44.8,32.1
Row31=35R,33.6,39.9,28.9,41.7,33.4
Row32=35L,33.7,40.2,30.5,43.3,33.2
Row33=36R,34.6,40,29.4,41.9,34.6
Row34=36L,34.5,40.8,30,42.9,34.2
Row35=36XL,34.7,41.1,31.5,44.6,33.9
Row36=36XL,34.7,41.1,31.5,44.6,33.9
Row37=37R,35,41.4,29.4,42.3,35.9
Row38=37L,35.6,41.6,30.2,43.1,35.4
Row39=38R,36.2,42.1,29.1,42.1,36.2
Row40=38L,36.4,42.1,30,43,36.2
Row41=38XL,36.5,42.6,31.5,44.7,35.9
Row42=38XL,36.5,42.6,31.5,44.7,35.9
Row43=39R,37.4,44.1,29,41.9,35.8
Row44=39L,37.7,43.1,30.9,44.2,37.7
Row45=40R,37.8,43.3,29.3,42.7,38
Row46=40L,38.6,44,30.9,44.4,38.1
Row47=40XL,38.1,44.4,31.6,45.2,37.5
Row48=40XL,38.1,44.4,31.6,45.2,37.5
Row49=42L,39,45.4,32.2,45.7,38.5
Row50=42L,39,45.4,32.2,45.7,38.5
Row51=42L,39,45.4,32.2,45.7,38.5
Row52=42L,39,45.4,32.2,45.7,38.5
Row53=42XL,39.6,45.9,32,45.9,38.9
Row54=42XL,39.6,45.9,32,45.9,38.9
Row55=42XL,39.6,45.9,32,45.9,38.9
Row56=42XL,39.6,45.9,32,45.9,38.9
Row57=42XL,39.6,45.9,32,45.9,38.9
Row58=42XL,39.6,45.9,32,45.9,38.9
Row59=42XL,39.6,45.9,32,45.9,38.9
Row60=42XL,39.6,45.9,32,45.9,38.9
Row61=44XL,40,46.4,32.4,46.2,39.6
Row62=44XL,40,46.4,32.4,46.2,39.6
Row63=44XL,40,46.4,32.4,46.2,39.6
Row64=44XL,40,46.4,32.4,46.2,39.6
Row65=44XL,40,46.4,32.4,46.2,39.6
Row66=44XL,40,46.4,32.4,46.2,39.6
Row67=44XL,40,46.4,32.4,46.2,39.6
Row68=44XL,40,46.4,32.4,46.2,39.6
```

```
[Garments\PGC 02111 MENS-COAT AW]
Name=PGC 02111 MENS-COAT AW
Table=MENS-COAT AW
Gender=m
Classification=1
Weighting=square

Measure1=BodyHeight, 1, 1, 1.5, 1.5, 3.5, 3.5
Measure2=BustCircumference, 1, 1, 3, 3, 4, 4
Measure3=WaistCircumference, 1, 1, 2.5, 2.5, 4, 4
Measure4=Seat, 2, 1, 2.5, 2.5, 4, 4
Measure5=ArmLengthFromNeck_l, 1, 1, 1, 1.5, 1.5, 3

[SizeTables\MENS-COAT AW]
Col1=Size
Col2=BodyHeight
Col3=BustCircumference
Col4=WaistCircumference
Col5=Seat
Col6=ArmLengthFromNeck_l

Row1=34S,64.5,33.9,28.1,35.2,30
Row2=34R,66.3,33.6,27.1,34.8,30.9
Row3=34L,68.4,34.9,28.4,35.5,32.4
Row4=36XS,61.6,35,29.2,36,29.1
Row5=36XS,61.6,35,29.2,36,29.1
Row6=36S,63.6,34.9,28.8,35.5,29.9
Row7=36R,66.6,34.8,28.6,36,31.3
Row8=36L,68.4,35,28.9,36.5,32.1
Row9=36XL,71.4,34.4,28.7,37.2,33.6
Row10=36XL,71.4,34.4,28.7,37.2,33.6
Row11=38XS,62.2,36.5,30.3,36.3,29.5
Row12=38XS,62.2,36.5,30.3,36.3,29.5
Row13=38S,64.6,36.3,30,36.8,30.7
Row14=38R,66.7,36.7,30.3,37.3,31.6
Row15=38L,69.6,36.4,30,37.5,32.9
Row16=38XL,71.2,36.3,29.9,37.4,33.8
Row17=38XL,71.2,36.3,29.9,37.4,33.8
Row18=40XS,62.8,38.3,32.1,38.1,29.9
Row19=40XS,62.8,38.3,32.1,38.1,29.9
Row20=40S,64.8,38.6,32.1,38.6,31.1
Row21=40R,67.5,38.2,31.8,38.8,32.2
Row22=40L,69.7,38.3,31.8,39.1,33.2
Row23=40XL,72.2,37.9,31.4,39.2,34.3
Row24=40XL,72.2,37.9,31.4,39.2,34.3
Row25=42XS,63.7,40.5,34.4,39.8,30.5
Row26=42XS,63.7,40.5,34.4,39.8,30.5
Row27=42S,65.5,40,33.5,40,31.6
```

```
Row28=42R,67.6,40,33.7,40.4,32.6
Row29=42L,70.1,40.2,33.7,40.8,33.7
Row30=42XL,72.8,39.7,33.1,40.7,34.9
Row31=42XL,72.8,39.7,33.1,40.7,34.9
Row32=44S,66.3,42.4,36.1,41.9,31.9
Row33=44R,68.1,42.3,35.8,42,33.2
Row34=44L,70.4,42.3,36,42.5,34.1
Row35=44XL,73.4,41.7,35.2,42.5,35.5
Row36=44XL,73.4,41.7,35.2,42.5,35.5
Row37=46S,66.9,44.1,37.2,42.3,32.7
Row38=46R,68.7,44.8,38.2,43.9,33.5
Row39=46L,70.6,44.5,38.2,44.1,34.5
Row40=46XL,74.2,43.7,37.1,44.5,36.2
Row41=46XL,74.2,43.7,37.1,44.5,36.2
Row42=48R,69.5,47.2,39.6,44.9,34.3
Row43=48L,70.9,45.3,39.8,45.3,35.3
Row44=48XL,74.7,46.9,39.8,45.9,36.6
Row45=48XL,74.7,46.9,39.8,45.9,36.6


[Garments\PGC 01672 MENS-SHIRT SS]
Name=PGC 01672 MENS-SHIRT SS
Table=MENS-SHIRT SS
Gender=m
Classification=0
Weighting=square

Measure1=NeckGirth, 20, 20, 0.6, 0.6, 1.5, 1.5
Measure2=BustCircumference, 1, 1, 2, 2, 4, 4
Measure3=ArmLengthFromNeck_l, 0, 0, 200, 200, 200, 200
Measure4=BodyHeight, 1, 1, 3, 3, 6, 6
Measure5=WaistCircumference, 1, 1, 2, 2, 4, 5

[SizeTables\MENS-SHIRT SS]
Col1=Size
Col2=NeckGirth
Col3=BustCircumference
Col4=ArmLengthFromNeck_l
Col5=BodyHeight
Col6=WaistCircumference

Row1=14,13.5,34.4,31.1,66,28.2
Row2=14.5,13.8,34.9,31.4,66.5,28.8
Row3=15,14.3,36.3,32,67.4,30.1
Row4=15.5,14.8,37.7,32.6,68.3,31.3
Row5=16,15.3,39.2,33.1,69.1,32.7
Row6=16.5,15.7,40.6,33.6,69.9,34.1
Row7=17,16.2,42.3,34,70.4,35.8
```

```
Row8=17.5,16.8,43.8,34.5,70.8,37.4
Row9=18,17.2,45.3,34.4,70.4,38.4
Row10=18.5,18.4,48.9,36.2,73.2,41.8
Row11=19,18.4,48.4,35.9,73.3,41.5


[Garments\PGC 02120 MENS-SHIRT LS]
Name=PGC 02120 MENS-SHIRT LS
Table=MENS-SHIRT LS
Gender=m
Classification=0
Weighting=square

Measure1=NeckGirth, 20, 20, 0.5, 0,5, 1, 1
Measure2=BustCircumference, 1, 1, 2, 1.5, 3, 3
Measure3=ArmLengthFromNeck_l, 1, 1, 1, 1.5, 1.5, 3
Measure4=BodyHeight, 1, 1, 1.5, 1.5, 3.5, 3.5
Measure5=WaistCircumference, 1, 1, 1.5, 1.5, 3, 3

[SizeTables\MENS-SHIRT LS]
Col1=Size
Col2=NeckGirth
Col3=BustCircumference
Col4=ArmLengthFromNeck_l
Col5=BodyHeight
Col6=WaistCircumference

Row1=14/29,13,34.1,30.4,64.3,27.2
Row2=14/01,13.2,33.6,30.1,63.8,27.3
Row3=14/23,13.6,34.7,30.9,66.4,28.6
Row4=14/45,14.1,37,32.8,69,30.3
Row5=14.5/01,13.8,34.5,30.2,64.3,28.5
Row6=14.5/23,13.8,34.6,31.3,66.6,28.6
Row7=14.5/45,13.7,34.7,32.8,69.9,28.8
Row8=15/01,14.4,36.1,30.5,64.4,29.9
Row9=15/23,14.3,36.2,31.8,66.9,29.9
Row10=15/45,14.2,36,33.2,70.1,29.9
Row11=15/67,14.2,36.5,34.2,72.4,30.8
Row12=15.5/01,14.9,37.8,30.8,64.8,31.2
Row13=15.5/23,14.8,37.6,32,67.3,31.3
Row14=15.5/45,14.7,37.3,33.3,70,30.9
Row15=15.5/67,14.5,37.5,34.8,72.6,31.1
Row16=15.5/38,14.6,37.1,33.6,69.3,30.2
Row17=16/01,15.4,38.9,31.1,65.4,32.3
Row18=16/23,15.3,39.5,32.3,67.3,32.9
Row19=16/45,15.2,39.1,33.6,70.2,32.6
Row20=16/67,15,38.9,35.2,73.1,32.2
Row21=16/38,15.2,38.6,36.3,75,32.6
```

```
Row22=16.5/01,15.6,39.9,32.2,67.2,33.4
Row23=16.5/23,15.8,40.9,32.5,67.4,34.4
Row24=16.5/45,15.7,40.8,33.8,70.2,34.2
Row25=16.5/67,15.5,39.9,35.4,73.4,33.4
Row26=16.5/38,15.7,40.5,36.1,75.2,33.6
Row27=17/23,16.5,42.4,32.6,67.3,35.7
Row28=17/45,16.3,42.6,33.9,70.2,36.2
Row29=17/67,16.1,42.5,35.4,73.2,35.9
Row30=17.5/23,16.9,44.7,33.4,68.4,37.5
Row31=17.5/45,17,44.1,34.4,70.6,37.6
Row32=18/23,18,46.9,35.2,70,39.2
Row33=18/45,17.4,45.6,34.7,70.8,39.2
Row34=18/67,17.2,46.2,34.9,71.6,38.2
Row35=18.5/45,18.6,46.6,33.9,69.3,40.9
Row36=18.5/67,16.8,46,36,73.1,38.2
Row37=19/67,17.2,46.3,36.3,73.5,40.4


[Garments\PGC 02192 CAP GARRISON]
Name=PGC 02192 CAP GARRISON
Table=CAP GARRISON
Gender=m
Classification=1
Weighting=square

Measure1=HeadCircumference, 1, 1, 1, 1, 1.5, 1.5

[SizeTables\CAP GARRISON]
Col1=Size
Col2=HeadCircumference

Row1=6.375,20.7
Row2=6.5,21
Row3=6.625,21.4
Row4=6.75,21.7
Row5=6.875,22.1
Row6=7,22.4
Row7=7.125,22.7
Row8=7.25,23.1
Row9=7.375,23.7
Row10=7.5,23.7
Row11=7.625,24.4
Row12=7.75,24.8
Row13=7.875,25.2
```

```
[Garments\PGC 00312 UNDERSHIRT CTN WHITE]
Name=PGC 00312 UNDERSHIRT CTN WHITE
Table=UNDERSHIRT CTN WHITE
Gender=m
Classification=1
Weighting=square

Measure1=BustCircumference, 2, 1, 1.5, 2, 4, 4

[SizeTables\UNDERSHIRT CTN WHITE]
Col1=Size
Col2=BustCircumference

Row1=XX-Small,27
Row2=X-Small,31
Row3=Small,35
Row4=Medium,39
Row5=Large,43
Row6=X-Large,47
Row7=XX-Large,51
Row8=XXX-Large,55
```

Appendix F – Statistical Analysis of the body measurements

PGC 02843 – Men's coat:

STATISTICAL SIZE ANALYSIS

Confidence-Alpha = 5%

Coat c1	Coat c2				Body height (in)	Arm length left (in)	Waist girth (in)	Waist band (in)	Buttock girth (in)	Inseam left (in)	Inseam right (in)	Sideseam at waist left (in)	Sideseam at waist right (in)
				Total Cases	8213	8213	8213	8213	8213	8213	8213	8213	8213
41		Coat c1	Coat c2	**Number**	775	775	775	775	775	775	775	775	775
41	0	=41		**Mean**	**68.8**	**24.7**	**33.7**	**34.2**	**40.7**	**30.7**	**30.7**	**43.6**	**43.7**
41	0			**Min**	**61.2**	**21.1**	**30.1**	**29.8**	**37.2**	**25.2**	**25.1**	**38.3**	**38.3**
41	0			**Max**	**75.3**	**28.2**	**37.8**	**40.8**	**48.1**	**35.1**	**35.1**	**51.1**	**51.1**
41	0			**StdDev**	**2.1**	**1.1**	**1.2**	**1.4**	**1.3**	**1.5**	**1.5**	**1.7**	**1.7**
41	0			**ConfidenzInterval**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
n.	a.	Coat c1	Coat c2	**Number**	238	238	238	238	238	238	238	238	238
n.	a.	=n.	=a.	**Mean**	**68.4**	**24.6**	**32.8**	**33.3**	**39.6**	**30.5**	**30.5**	**43.4**	**43.4**
n.	a.			**Min**	**59.3**	**20.8**	**26.0**	**27.9**	**33.6**	**23.5**	**23.6**	**37.2**	**37.2**
n.	a.			**Max**	**78.2**	**29.2**	**42.1**	**41.4**	**45.8**	**36.6**	**36.5**	**50.7**	**50.7**
n.	a.			**StdDev**	**2.9**	**1.4**	**2.6**	**2.4**	**2.3**	**1.9**	**1.9**	**2.1**	**2.1**
n.	a.			**ConfidenzInterval**	**0.4**	**0.2**	**0.3**	**0.3**	**0.3**	**0.2**	**0.2**	**0.3**	**0.3**
30	R	Coat c1	Coat c2	**Number**	0	0	0	0	0	0	0	0	0
30	R	=30	=R	**Mean**									
30	R			**Min**									
30	R			**Max**									
30	R			**StdDev**									
30	R			**ConfidenzInterval**									
31	R	Coat c1	Coat c2	**Number**	0	0	0	0	0	0	0	0	0
31	R	=31	=R	**Mean**									
31	R			**Min**									
31	R			**Max**									
31	R			**StdDev**									
31	R			**ConfidenzInterval**									
32	R	Coat c1	Coat c2	**Number**	1	1	1	1	1	1	1	1	1
32	R	=32	=R	**Mean**	**64.4**	**21.7**	**28.7**	**29.9**	**31.8**	**26.7**	**26.5**	**41.2**	**41.0**
32	R			**Min**	**64.4**	**21.7**	**28.7**	**29.9**	**31.8**	**26.7**	**26.5**	**41.2**	**41.0**
32	R			**Max**	**64.4**	**21.7**	**28.7**	**29.9**	**31.8**	**26.7**	**26.5**	**41.2**	**41.0**
32	R			**StdDev**									
32	R			**ConfidenzInterval**									
33	S	Coat c1	Coat c2	**Number**	0	0	0	0	0	0	0	0	0
33	S	=33	=S	**Mean**									
33	S			**Min**									
33	S			**Max**									
33	S			**StdDev**									
33	S			**ConfidenzInterval**									
33	R	Coat c1	Coat c2	**Number**	1	1	1	1	1	1	1	1	1
33	R	=33	=R	**Mean**	**66.5**	**23.1**	**25.7**	**27.7**	**33.0**	**29.8**	**29.7**	**42.2**	**42.1**
33	R			**Min**	**66.5**	**23.1**	**25.7**	**27.7**	**33.0**	**29.8**	**29.7**	**42.2**	**42.1**
33	R			**Max**	**66.5**	**23.1**	**25.7**	**27.7**	**33.0**	**29.8**	**29.7**	**42.2**	**42.1**
33	R			**StdDev**									
33	R			**ConfidenzInterval**									
33	L	Coat c1	Coat c2	**Number**	0	0	0	0	0	0	0	0	0
33	L	=33	=L	**Mean**									
33	L			**Min**									
33	L			**Max**									
33	L			**StdDev**									
33	L			**ConfidenzInterval**									
34	XS	Coat c1	Coat c2	**Number**	0	0	0	0	0	0	0	0	0
34	XS	=34	=XS	**Mean**									
34	XS			**Min**									
34	XS			**Max**									
34	XS			**StdDev**									
34	XS			**ConfidenzInterval**									

34	S	Coat c1	Coat c2	Number	11	11	11	11	11	11	11	11	11
34	S	=34	=S	Mean	64.4	22.6	27.2	28.2	34.0	28.5	28.5	40.8	41.0
34	S			Min	63.1	22.0	26.2	26.8	33.2	27.2	27.3	39.8	40.1
34	S			Max	66.2	23.5	27.9	29.9	35.2	29.4	29.5	41.9	41.9
34	S			StdDev	0.8	0.5	0.6	0.9	0.7	0.7	0.7	0.5	0.5
34	S			ConfidenzInterval	0.5	0.3	0.4	0.6	0.4	0.4	0.4	0.3	0.3
34	R	Coat c1	Coat c2	Number	11	11	11	11	11	11	11	11	11
34	R	=34	=R	Mean	65.9	23.4	27.3	28.7	34.4	29.3	29.3	42.2	42.2
34	R			Min	63.1	21.9	25.3	26.5	31.8	27.3	27.3	39.8	39.9
34	R			Max	68.1	25.0	34.8	33.0	38.7	31.3	31.3	44.1	44.2
34	R			StdDev	1.4	1.0	2.7	1.7	1.8	1.3	1.3	1.4	1.4
34	R			ConfidenzInterval	0.8	0.6	1.6	1.0	1.1	0.7	0.8	0.8	0.8
34	L	Coat c1	Coat c2	Number	6	6	6	6	6	6	6	6	6
34	L	=34	=L	Mean	69.4	24.8	27.9	30.0	36.6	31.4	31.4	44.5	44.5
34	L			Min	68.1	23.9	26.2	27.3	34.8	30.0	30.0	43.5	43.7
34	L			Max	71.9	25.2	31.8	33.7	41.0	33.7	33.7	46.8	46.6
34	L			StdDev	1.4	0.5	2.0	2.2	2.3	1.4	1.4	1.2	1.1
34	L			ConfidenzInterval	1.1	0.4	1.6	1.8	1.9	1.1	1.1	0.9	0.9
35	XS	Coat c1	Coat c2	Number	4	4	4	4	4	4	4	4	4
35	XS	=35	=XS	Mean	61.7	22.2	27.8	27.9	34.3	26.1	26.1	38.6	38.7
35	XS			Min	60.8	21.4	26.9	25.5	33.7	25.0	25.1	38.4	38.4
35	XS			Max	62.4	22.8	28.6	29.9	35.5	27.7	27.7	38.9	39.0
35	XS			StdDev	0.6	0.6	0.7	1.8	0.8	1.2	1.2	0.3	0.3
35	XS			ConfidenzInterval	0.6	0.6	0.7	1.8	0.8	1.2	1.2	0.3	0.3
35	S	Coat c1	Coat c2	Number	43	43	43	43	43	43	43	43	43
35	S	=35	=S	Mean	64.4	23.0	27.8	28.5	34.9	28.7	28.7	40.9	40.9
35	S			Min	62.1	20.8	25.9	26.4	32.7	26.6	26.8	38.9	38.9
35	S			Max	66.5	24.7	29.3	30.6	41.2	31.0	31.1	43.2	43.1
35	S			StdDev	1.0	0.8	0.8	1.0	1.3	1.2	1.2	1.0	1.0
35	S			ConfidenzInterval	0.3	0.2	0.2	0.3	0.4	0.4	0.4	0.3	0.3
35	R	Coat c1	Coat c2	Number	58	58	58	58	58	58	58	58	58
35	R	=35	=R	Mean	66.7	23.7	27.9	29.0	35.2	29.8	29.8	42.4	42.4
35	R			Min	64.1	22.4	25.7	26.7	33.4	26.1	26.1	40.0	39.9
35	R			Max	74.3	26.8	32.0	35.3	43.7	34.5	34.4	47.8	47.9
35	R			StdDev	1.5	0.8	1.0	1.3	1.5	1.3	1.3	1.2	1.3
35	R			ConfidenzInterval	0.4	0.2	0.3	0.3	0.4	0.3	0.3	0.3	0.3
35	L	Coat c1	Coat c2	Number	14	14	14	14	14	14	14	14	14
35	L	=35	=L	Mean	69.7	24.9	27.7	29.9	35.8	31.4	31.5	44.5	44.5
35	L			Min	67.8	23.6	25.5	27.5	34.4	29.6	29.7	43.1	43.1
35	L			Max	72.2	26.2	29.8	32.1	37.3	33.5	33.5	46.3	46.2
35	L			StdDev	1.2	0.7	1.1	1.6	0.9	1.3	1.3	0.9	0.9
35	L			ConfidenzInterval	0.6	0.4	0.6	0.8	0.5	0.7	0.7	0.5	0.5
35	XL	Coat c1	Coat c2	Number	0	0	0	0	0	0	0	0	0
35	XL	=35	=XL	Mean									
35	XL			Min									
35	XL			Max									
35	XL			StdDev									
35	XL			ConfidenzInterval									
36	XS	Coat c1	Coat c2	Number	6	6	6	6	6	6	6	6	6
36	XS	=36	=XS	Mean	61.1	21.6	29.1	28.7	35.1	26.8	26.8	38.1	38.1
36	XS			Min	58.7	20.8	28.4	26.4	33.1	24.9	25.1	36.0	36.0
36	XS			Max	62.4	22.5	30.1	30.7	37.8	29.7	29.6	40.8	40.7
36	XS			StdDev	1.3	0.6	0.7	1.5	1.7	1.7	1.7	1.6	1.6
36	XS			ConfidenzInterval	1.1	0.5	0.6	1.2	1.4	1.4	1.3	1.3	1.3
36	S	Coat c1	Coat c2	Number	95	95	95	95	95	95	95	95	95
36	S	=36	=S	Mean	64.2	22.8	28.9	29.3	35.8	28.5	28.6	40.7	40.7
36	S			Min	60.2	19.8	26.2	26.1	33.2	25.8	25.6	37.0	37.0
36	S			Max	66.8	25.4	31.7	32.2	38.1	30.8	30.8	43.3	43.3
36	S			StdDev	1.2	1.0	1.0	1.2	1.0	1.1	1.1	1.1	1.1
36	S			ConfidenzInterval	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
36	R	Coat c1	Coat c2	Number	288	288	288	288	288	288	288	288	288
36	R	=36	=R	Mean	67.0	23.9	28.9	29.9	36.3	30.1	30.1	42.6	42.6
36	R			Min	62.7	20.9	26.6	26.6	33.9	26.4	26.5	39.7	39.7
36	R			Max	70.4	26.2	32.3	34.3	46.4	34.4	34.2	45.8	45.8
36	R			StdDev	1.2	0.9	1.0	1.1	1.2	1.2	1.2	1.1	1.1
36	R			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
36	L	Coat c1	Coat c2	Number	102	102	102	102	102	102	102	102	102
36	L	=36	=L	Mean	69.7	24.9	28.6	30.2	36.3	31.6	31.6	44.7	44.7
36	L			Min	65.7	22.2	26.0	27.2	33.9	29.0	28.8	41.9	42.1
36	L			Max	73.5	27.0	32.8	33.7	39.8	35.2	35.1	47.7	47.6
36	L			StdDev	1.3	1.0	0.9	1.2	1.0	1.3	1.3	1.1	1.1
36	L			ConfidenzInterval	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

36	XL	Coat c1	Coat c2	Number	10	10	10	10	10	10	10	10	10
36	XL	=36	=XL	Mean	71.2	25.3	28.5	30.3	36.1	32.5	32.6	45.6	45.7
36	XL			Min	64.0	23.9	27.0	29.0	35.2	29.2	29.3	40.7	40.8
36	XL			Max	73.5	26.7	32.5	32.1	37.5	34.8	34.7	47.2	47.4
36	XL			StdDev	2.7	0.9	1.5	0.9	0.8	1.4	1.4	1.9	1.9
36	XL			ConfidenzInterval	1.7	0.6	0.9	0.5	0.5	0.9	0.9	1.2	1.2
37	XS	Coat c1	Coat c2	Number	12	12	12	12	12	12	12	12	12
37	XS	=37	=XS	Mean	61.7	21.5	30.7	30.3	36.5	26.5	26.5	38.4	38.4
37	XS			Min	59.0	20.1	29.0	28.6	34.5	24.1	23.8	35.5	35.4
37	XS			Max	64.1	23.8	33.0	34.2	38.8	29.3	29.3	41.1	41.1
37	XS			StdDev	1.7	1.3	1.2	1.4	1.4	1.7	1.7	1.7	1.8
37	XS			ConfidenzInterval	1.0	0.7	0.7	0.8	0.8	1.0	1.0	1.0	1.0
37	S	Coat c1	Coat c2	Number	124	124	124	124	124	124	124	124	124
37	S	=37	=S	Mean	64.3	23.0	30.1	30.3	36.7	28.4	28.4	40.7	40.7
37	S			Min	60.8	20.0	27.5	27.9	34.6	24.5	24.6	37.7	37.8
37	S			Max	67.5	25.0	32.4	37.4	39.5	31.6	31.8	43.7	44.2
37	S			StdDev	1.3	0.9	1.0	1.3	1.1	1.2	1.2	1.1	1.2
37	S			ConfidenzInterval	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
37	R	Coat c1	Coat c2	Number	409	409	409	409	409	409	409	409	409
37	R	=37	=R	Mean	67.0	24.0	29.8	30.6	37.0	30.0	30.0	42.6	42.6
37	R			Min	63.1	21.3	27.4	27.6	33.4	26.5	26.4	39.7	39.7
37	R			Max	70.6	26.7	40.1	40.8	45.4	33.5	33.3	45.0	45.3
37	R			StdDev	1.2	0.9	1.1	1.3	1.2	1.2	1.1	1.0	1.0
37	R			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
37	L	Coat c1	Coat c2	Number	287	287	287	287	287	287	287	287	287
37	L	=37	=L	Mean	69.8	25.0	29.6	30.9	37.1	31.6	31.6	44.7	44.7
37	L			Min	66.8	22.3	26.5	27.8	34.7	28.3	28.5	41.7	41.8
37	L			Max	73.2	27.5	33.5	34.6	40.8	36.1	35.9	49.4	49.4
37	L			StdDev	1.1	0.9	1.0	1.1	1.0	1.1	1.1	1.0	1.0
37	L			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
37	XL	Coat c1	Coat c2	Number	29	29	29	29	29	29	29	29	29
37	XL	=37	=XL	Mean	72.9	26.0	29.5	31.7	37.4	33.5	33.5	46.9	46.9
37	XL			Min	59.0	21.1	27.8	29.6	35.2	25.6	25.6	36.3	36.3
37	XL			Max	76.3	28.0	31.6	33.8	40.0	36.7	36.8	49.8	49.9
37	XL			StdDev	2.9	1.2	0.9	1.0	1.3	1.8	1.8	2.3	2.3
37	XL			ConfidenzInterval	1.1	0.4	0.3	0.4	0.5	0.7	0.7	0.8	0.8
38	XS	Coat c1	Coat c2	Number	11	11	11	11	11	11	11	11	11
38	XS	=38	=XS	Mean	62.5	22.3	30.0	29.8	36.7	27.5	27.4	39.4	39.3
38	XS			Min	60.8	21.0	28.9	28.1	35.2	25.8	25.7	38.0	37.9
38	XS			Max	64.0	24.2	31.2	31.9	39.2	28.9	28.9	40.9	41.1
38	XS			StdDev	0.9	0.9	0.7	1.2	1.3	1.0	0.9	0.9	0.9
38	XS			ConfidenzInterval	0.5	0.5	0.4	0.7	0.8	0.6	0.6	0.5	0.5
38	S	Coat c1	Coat c2	Number	93	93	93	93	93	93	93	93	93
38	S	=38	=S	Mean	64.5	23.0	30.8	30.9	37.3	28.5	28.5	40.7	40.7
38	S			Min	61.1	20.6	28.1	27.8	34.3	24.8	24.6	38.0	37.9
38	S			Max	67.2	25.4	33.4	36.3	41.6	31.4	31.5	44.0	44.0
38	S			StdDev	1.3	0.9	1.1	1.5	1.3	1.3	1.3	1.2	1.2
38	S			ConfidenzInterval	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2
38	R	Coat c1	Coat c2	Number	593	593	593	593	593	593	593	593	593
38	R	=38	=R	Mean	67.2	24.1	30.7	31.2	37.7	30.1	30.2	42.7	42.8
38	R			Min	62.4	21.0	27.6	27.5	34.6	25.9	25.7	39.2	39.3
38	R			Max	71.3	27.0	35.7	36.5	45.2	33.6	33.6	46.0	46.4
38	R			StdDev	1.2	0.9	1.0	1.2	1.1	1.2	1.2	1.1	1.1
38	R			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
38	L	Coat c1	Coat c2	Number	429	429	429	429	429	429	429	429	429
38	L	=38	=L	Mean	69.9	25.1	30.5	31.8	38.0	31.6	31.7	44.7	44.7
38	L			Min	65.0	22.2	27.7	27.8	34.6	27.1	26.9	40.4	40.2
38	L			Max	73.5	28.0	33.3	37.7	43.4	35.5	35.5	48.2	48.0
38	L			StdDev	1.2	0.9	1.0	1.3	1.1	1.2	1.2	1.1	1.1
38	L			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
38	XL	Coat c1	Coat c2	Number	96	96	96	96	96	96	96	96	96
38	XL	=38	=XL	Mean	72.7	26.3	30.1	32.1	37.8	33.4	33.4	46.9	46.9
38	XL			Min	65.2	23.9	27.5	28.1	35.7	29.2	29.1	41.2	41.3
38	XL			Max	77.6	29.8	32.6	34.6	40.6	37.9	38.0	50.8	50.7
38	XL			StdDev	1.6	1.1	1.0	1.3	0.9	1.4	1.4	1.3	1.3
38	XL			ConfidenzInterval	0.3	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3
39	XS	Coat c1	Coat c2	Number	7	7	7	7	7	7	7	7	7
39	XS	=39	=XS	Mean	61.9	21.6	31.4	30.8	37.3	26.9	26.9	39.0	39.0
39	XS			Min	60.5	20.2	29.5	28.1	34.9	25.3	25.4	37.7	37.7
39	XS			Max	65.2	22.5	33.7	33.3	38.8	28.5	28.4	40.2	40.1
39	XS			StdDev	1.6	0.8	1.4	1.8	1.4	1.2	1.2	1.2	1.1
39	XS			ConfidenzInterval	1.2	0.6	1.0	1.3	1.0	0.9	0.9	0.9	0.8

39	S	Coat c1	Coat c2	Number	123	123	123	123	123	123	123	123	123
39	S	=39	=S	Mean	64.4	23.0	31.4	31.5	38.0	28.4	28.4	40.6	40.6
39	S			Min	61.5	21.0	28.5	28.2	35.5	25.0	24.9	38.2	38.2
39	S			Max	66.5	25.3	35.0	34.4	40.6	30.7	30.7	43.0	43.0
39	S			StdDev	1.2	0.9	1.2	1.4	1.1	1.1	1.1	1.0	1.0
39	S			ConfidenzInterval	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
39	R	Coat c1	Coat c2	Number	493	493	493	493	493	493	493	493	493
39	R	=39	=R	Mean	67.2	24.1	31.8	32.2	38.8	29.9	29.9	42.6	42.6
39	R			Min	62.8	21.7	28.7	28.2	35.7	26.7	26.2	39.4	39.5
39	R			Max	70.1	26.6	37.2	40.1	48.4	33.8	33.5	45.6	45.6
39	R			StdDev	1.2	0.9	1.1	1.4	1.3	1.1	1.1	1.0	1.0
39	R			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
39	L	Coat c1	Coat c2	Number	512	512	512	512	512	512	512	512	512
39	L	=39	=L	Mean	69.9	25.2	31.4	32.3	38.8	31.6	31.7	44.7	44.7
39	L			Min	65.9	21.0	27.6	28.7	34.3	25.7	25.7	41.0	40.9
39	L			Max	74.0	27.7	34.9	42.9	48.2	35.6	35.8	49.2	49.4
39	L			StdDev	1.2	0.9	1.1	1.4	1.2	1.2	1.2	1.1	1.1
39	L			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
39	XL	Coat c1	Coat c2	Number	143	143	143	143	143	143	143	143	143
39	XL	=39	=XL	Mean	73.0	26.5	31.0	32.5	39.0	33.8	33.8	47.1	47.2
39	XL			Min	70.1	24.3	28.3	29.3	35.7	30.7	30.7	44.2	44.4
39	XL			Max	76.3	28.5	33.7	35.4	42.2	37.9	38.1	50.1	51.3
39	XL			StdDev	1.2	0.9	1.1	1.3	1.2	1.2	1.2	1.1	1.1
39	XL			ConfidenzInterval	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
40	XS	Coat c1	Coat c2	Number	5	5	5	5	5	5	5	5	5
40	XS	=40	=XS	Mean	61.6	22.1	32.9	32.6	39.2	26.6	26.6	38.5	38.4
40	XS			Min	60.0	20.3	31.8	31.5	38.6	24.2	24.1	36.9	36.8
40	XS			Max	63.7	23.4	33.8	33.2	39.9	27.7	27.6	40.1	40.1
40	XS			StdDev	1.5	1.2	0.9	0.7	0.6	1.4	1.4	1.2	1.3
40	XS			ConfidenzInterval	1.3	1.0	0.8	0.6	0.5	1.2	1.3	1.1	1.1
40	S	Coat c1	Coat c2	Number	123	123	123	123	123	123	123	123	123
40	S	=40	=S	Mean	64.6	23.0	32.8	32.7	39.1	28.2	28.3	40.5	40.6
40	S			Min	60.8	20.9	29.8	29.0	36.5	25.0	25.1	37.7	37.8
40	S			Max	67.8	25.1	36.4	37.3	42.9	31.0	31.1	43.5	44.1
40	S			StdDev	1.2	0.9	1.2	1.3	1.2	1.2	1.2	1.1	1.1
40	S			ConfidenzInterval	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
40	R	Coat c1	Coat c2	Number	472	472	472	472	472	472	472	472	472
40	R	=40	=R	Mean	67.3	24.1	32.9	33.2	39.7	29.9	29.9	42.6	42.6
40	R			Min	63.4	20.4	29.7	28.9	36.8	25.5	25.4	39.5	39.5
40	R			Max	70.1	26.5	36.1	42.4	46.7	32.8	32.8	46.1	45.6
40	R			StdDev	1.1	0.9	1.2	1.5	1.3	1.2	1.2	1.0	1.0
40	R			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
40	L	Coat c1	Coat c2	Number	562	562	562	562	562	562	562	562	562
40	L	=40	=L	Mean	70.2	25.3	32.3	33.2	39.8	31.7	31.7	44.8	44.8
40	L			Min	66.8	22.5	27.2	28.7	36.5	28.5	28.5	41.8	41.9
40	L			Max	74.1	28.1	36.2	36.7	44.5	35.1	35.2	49.7	48.7
40	L			StdDev	1.1	0.9	1.1	1.3	1.2	1.1	1.1	1.1	1.1
40	L			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
40	XL	Coat c1	Coat c2	Number	222	222	222	222	222	222	222	222	222
40	XL	=40	=XL	Mean	73.3	26.6	32.4	33.8	40.2	33.5	33.5	47.0	47.1
40	XL			Min	70.4	23.7	28.6	29.6	35.7	29.8	30.0	44.4	44.4
40	XL			Max	77.6	29.0	37.1	37.3	44.0	37.3	37.3	50.4	50.5
40	XL			StdDev	1.3	1.0	1.2	1.4	1.3	1.3	1.3	1.2	1.2
40	XL			ConfidenzInterval	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
41	XS	Coat c1	Coat c2	Number	0	0	0	0	0	0	0	0	0
41	XS	=41	=XS	Mean									
41	XS			Min									
41	XS			Max									
41	XS			StdDev									
41	XS			ConfidenzInterval									
41	S	Coat c1	Coat c2	Number	54	54	54	54	54	54	54	54	54
41	S	=41	=S	Mean	64.9	23.0	34.0	33.7	40.1	28.4	28.4	40.7	40.7
41	S			Min	61.2	21.2	31.3	31.1	37.6	26.2	26.1	38.4	38.3
41	S			Max	68.5	24.9	36.6	37.9	43.4	31.0	31.0	43.9	43.3
41	S			StdDev	1.2	1.0	1.2	1.3	1.2	1.1	1.1	1.1	1.1
41	S			ConfidenzInterval	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3
41	R	Coat c1	Coat c2	Number	310	310	310	310	310	310	310	310	310
41	R	=41	=R	Mean	67.5	24.2	34.0	34.2	40.7	29.9	30.0	42.7	42.7
41	R			Min	64.0	21.1	30.1	30.4	37.4	25.2	25.1	38.3	38.3
41	R			Max	74.5	28.1	37.8	38.6	48.1	34.8	34.9	51.1	48.6
41	R			StdDev	1.3	0.9	1.3	1.3	1.3	1.1	1.2	1.2	1.2
41	R			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

41	L	Coat c1	Coat c2	Number	395	395	395	395	395	395	395	395	395
41	L	=41	=L	Mean	70.1	25.2	33.5	34.3	40.7	31.5	31.5	44.7	44.7
41	L			Min	67.8	22.8	30.1	29.8	37.2	27.0	26.9	41.7	41.7
41	L			Max	73.2	28.2	36.9	40.8	45.0	35.1	35.1	47.5	51.1
41	L			StdDev	1.1	0.8	1.2	1.4	1.2	1.2	1.2	1.0	1.1
41	L			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
41	XL	Coat c1	Coat c2	Number	16	16	16	16	16	16	16	16	16
41	XL	=41	=XL	Mean	73.1	26.1	33.2	34.6	40.8	33.0	33.0	46.6	46.6
41	XL			Min	70.4	24.4	31.3	32.4	38.3	31.6	31.5	44.9	44.9
41	XL			Max	75.3	27.7	35.3	37.0	42.7	34.3	34.2	48.8	48.8
41	XL			StdDev	1.2	1.0	1.0	1.3	1.4	0.9	0.9	1.1	1.1
41	XL			ConfidenzInterval	0.6	0.5	0.5	0.7	0.7	0.4	0.4	0.5	0.5
42	XS	Coat c1	Coat c2	Number	3	3	3	3	3	3	3	3	3
42	XS	=42	=XS	Mean	63.3	22.5	34.8	34.5	40.1	27.8	27.8	39.5	39.5
42	XS			Min	62.8	21.1	34.4	33.7	37.7	26.2	26.3	38.9	38.9
42	XS			Max	64.0	23.4	35.2	35.2	42.9	29.4	29.4	40.6	40.6
42	XS			StdDev	0.6	1.3	0.4	0.8	2.6	1.6	1.5	0.9	1.0
42	XS			ConfidenzInterval	0.7	1.4	0.5	0.9	3.0	1.8	1.7	1.0	1.1
42	S	Coat c1	Coat c2	Number	45	45	45	45	45	45	45	45	45
42	S	=42	=S	Mean	64.9	23.4	34.7	34.3	40.5	28.5	28.5	40.8	40.9
42	S			Min	63.1	22.0	31.5	31.0	37.2	25.8	25.8	39.0	39.1
42	S			Max	66.8	25.7	37.3	36.5	43.8	31.5	31.5	43.3	43.2
42	S			StdDev	1.1	0.9	1.4	1.4	1.4	1.3	1.3	1.0	1.0
42	S			ConfidenzInterval	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3
42	R	Coat c1	Coat c2	Number	218	218	218	218	218	218	218	218	218
42	R	=42	=R	Mean	67.4	24.3	35.1	35.3	41.3	29.9	29.9	42.6	42.7
42	R			Min	62.7	21.5	32.0	31.1	38.3	27.5	27.4	39.9	39.9
42	R			Max	69.4	26.4	38.3	39.0	44.3	33.1	33.1	45.1	45.1
42	R			StdDev	1.1	0.9	1.2	1.2	1.1	1.0	1.0	1.0	1.0
42	R			ConfidenzInterval	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1
42	L	Coat c1	Coat c2	Number	423	423	423	423	423	423	423	423	423
42	L	=42	=L	Mean	70.3	25.4	34.6	35.2	41.5	31.5	31.5	44.7	44.7
42	L			Min	66.2	22.7	30.2	29.8	37.1	28.7	28.8	40.6	40.6
42	L			Max	73.8	28.0	37.4	38.4	45.6	35.5	35.5	48.6	48.5
42	L			StdDev	1.2	0.9	1.3	1.5	1.3	1.2	1.2	1.1	1.1
42	L			ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
42	XL	Coat c1	Coat c2	Number	178	178	178	178	178	178	178	178	178
42	XL	=42	=XL	Mean	73.3	26.7	34.2	35.4	41.7	33.4	33.4	47.0	47.0
42	XL			Min	70.1	23.9	30.6	30.1	38.9	30.9	30.9	44.6	44.6
42	XL			Max	77.6	29.4	38.7	38.7	45.7	37.1	37.2	50.7	51.6
42	XL			StdDev	1.4	1.1	1.5	1.5	1.4	1.3	1.3	1.2	1.3
42	XL			ConfidenzInterval	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
43	S	Coat c1	Coat c2	Number	19	19	19	19	19	19	19	19	19
43	S	=43	=S	Mean	64.9	23.0	35.9	35.6	41.8	28.1	28.1	40.5	40.6
43	S			Min	62.8	20.3	34.1	33.2	39.3	26.8	26.5	38.6	38.5
43	S			Max	66.5	24.6	39.9	37.8	50.8	29.6	29.6	42.2	42.3
43	S			StdDev	1.1	0.9	1.5	1.3	2.4	0.9	0.9	1.0	1.0
43	S			ConfidenzInterval	0.5	0.4	0.7	0.6	1.1	0.4	0.4	0.5	0.5
43	R	Coat c1	Coat c2	Number	121	121	121	121	121	121	121	121	121
43	R	=43	=R	Mean	67.7	24.1	36.1	36.1	42.1	29.7	29.8	42.6	42.6
43	R			Min	65.0	21.2	32.7	32.8	39.5	26.1	26.1	40.1	40.1
43	R			Max	70.4	26.3	38.4	40.3	45.1	33.0	32.8	45.2	45.1
43	R			StdDev	1.1	0.9	1.2	1.2	1.2	1.2	1.2	1.0	0.9
43	R			ConfidenzInterval	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
43	L	Coat c1	Coat c2	Number	208	208	208	208	208	208	208	208	208
43	L	=43	=L	Mean	70.3	25.3	36.0	36.6	42.6	31.3	31.3	44.6	44.6
43	L			Min	67.5	22.9	32.3	31.4	37.9	27.9	27.8	41.2	41.2
43	L			Max	74.8	27.8	38.7	40.3	47.1	34.6	34.7	47.8	47.8
43	L			StdDev	1.3	1.0	1.2	1.4	1.3	1.2	1.2	1.2	1.2
43	L			ConfidenzInterval	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
43	XL	Coat c1	Coat c2	Number	68	68	68	68	68	68	68	68	68
43	XL	=43	=XL	Mean	73.6	26.7	35.6	36.5	43.2	33.4	33.4	47.0	47.0
43	XL			Min	70.9	24.6	32.2	31.7	39.9	30.7	30.8	44.1	44.4
43	XL			Max	78.2	29.8	40.4	40.0	46.8	36.7	36.7	50.0	50.0
43	XL			StdDev	1.3	1.0	1.4	1.6	1.6	1.3	1.3	1.3	1.2
43	XL			ConfidenzInterval	0.3	0.2	0.3	0.4	0.4	0.3	0.3	0.3	0.3
44	XS	Coat c1	Coat c2	Number	0	0	0	0	0	0	0	0	0
44	XS	=44	=XS	Mean									
44	XS			Min									
44	XS			Max									
44	XS			StdDev									
44	XS			ConfidenzInterval									

44	S	Coat c1	Coat c2	Number	11	11	11	11	11	11	11	11	11
44	S	=44	=S	Mean	65.4	23.8	37.2	36.6	42.4	28.5	28.5	40.9	40.9
44	S			Min	64.0	22.4	35.4	34.5	40.5	27.1	27.3	39.8	39.8
44	S			Max	66.8	25.2	38.5	37.9	45.1	29.7	29.7	42.0	42.0
44	S			StdDev	1.0	0.9	0.9	1.1	1.4	0.9	0.8	0.8	0.8
44	S			ConfidenzInterval	0.6	0.5	0.5	0.6	0.9	0.5	0.5	0.5	0.5
44	R	Coat c1	Coat c2	Number	78	78	78	78	78	78	78	78	78
44	R	=44	=R	Mean	67.6	24.4	37.2	36.8	42.7	29.8	29.8	42.7	42.7
44	R			Min	64.0	22.1	32.0	31.9	39.3	26.9	26.9	39.9	39.8
44	R			Max	69.7	26.1	40.0	40.1	46.5	31.7	31.7	45.7	45.5
44	R			StdDev	1.2	0.9	1.4	1.3	1.4	1.1	1.1	1.1	1.1
44	R			ConfidenzInterval	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2
44	L	Coat c1	Coat c2	Number	198	198	198	198	198	198	198	198	198
44	L	=44	=L	Mean	70.4	25.4	37.1	37.4	43.3	31.3	31.3	44.7	44.7
44	L			Min	66.8	21.9	33.4	32.7	39.7	28.0	28.1	42.2	42.0
44	L			Max	73.7	28.1	40.4	41.1	47.2	33.8	33.9	48.3	47.3
44	L			StdDev	1.1	1.0	1.2	1.3	1.5	1.1	1.1	1.1	1.0
44	L			ConfidenzInterval	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1
44	XL	Coat c1	Coat c2	Number	66	66	66	66	66	66	66	66	66
44	XL	=44	=XL	Mean	73.8	26.8	36.8	37.9	44.0	33.5	33.5	47.3	47.4
44	XL			Min	70.3	24.6	33.5	33.6	40.3	30.8	30.8	44.7	44.8
44	XL			Max	77.9	29.5	39.3	41.7	47.5	36.2	36.2	50.7	52.1
44	XL			StdDev	1.3	1.1	1.3	1.5	1.6	1.3	1.3	1.3	1.3
44	XL			ConfidenzInterval	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3
46	R	Coat c1	Coat c2	Number	25	25	25	25	25	25	25	25	25
46	R	=46	=R	Mean	68.3	24.6	38.9	38.5	43.9	29.9	29.9	43.0	43.0
46	R			Min	66.2	23.4	36.1	35.8	41.2	28.0	28.1	40.8	40.7
46	R			Max	70.9	27.1	41.0	40.1	47.2	33.5	33.5	46.0	46.0
46	R			StdDev	1.2	1.0	1.4	1.1	1.4	1.3	1.3	1.3	1.3
46	R			ConfidenzInterval	0.5	0.4	0.5	0.4	0.6	0.5	0.5	0.5	0.5
46	L	Coat c1	Coat c2	Number	95	95	95	95	95	95	95	95	95
46	L	=46	=L	Mean	70.7	25.4	38.7	38.7	44.4	31.2	31.2	44.8	44.8
46	L			Min	64.7	22.4	35.8	34.5	41.2	27.0	27.2	39.8	39.9
46	L			Max	73.7	27.8	42.3	42.9	47.9	34.5	34.5	47.8	47.8
46	L			StdDev	1.4	1.0	1.3	1.4	1.3	1.3	1.3	1.2	1.2
46	L			ConfidenzInterval	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2
46	XL	Coat c1	Coat c2	Number	29	29	29	29	29	29	29	29	29
46	XL	=46	=XL	Mean	73.9	27.0	38.8	39.2	45.3	33.2	33.2	47.1	47.1
46	XL			Min	71.6	25.3	34.7	35.9	43.4	30.6	30.7	44.7	44.7
46	XL			Max	78.5	30.3	41.4	41.9	48.4	35.7	35.6	50.5	50.3
46	XL			StdDev	1.4	1.2	1.6	1.2	1.3	1.2	1.2	1.2	1.3
46	XL			ConfidenzInterval	0.5	0.4	0.6	0.4	0.5	0.4	0.4	0.5	0.5
48	R	Coat c1	Coat c2	Number	3	3	3	3	3	3	3	3	3
48	R	=48	=R	Mean	69.0	24.5	40.2	39.7	45.7	29.6	29.7	43.3	43.2
48	R			Min	67.8	23.6	36.9	39.0	43.8	28.8	28.5	41.6	41.6
48	R			Max	70.9	25.6	42.2	40.4	47.4	30.3	30.3	44.3	44.3
48	R			StdDev	1.7	1.0	2.9	0.7	1.8	0.8	1.0	1.5	1.4
48	R			ConfidenzInterval	1.9	1.1	3.2	0.8	2.1	0.9	1.1	1.7	1.6
48	L	Coat c1	Coat c2	Number	16	16	16	16	16	16	16	16	16
48	L	=48	=L	Mean	71.0	25.8	40.7	41.1	45.5	31.3	31.3	45.1	45.1
48	L			Min	69.1	23.7	37.9	38.5	42.7	27.7	27.7	43.5	43.4
48	L			Max	74.1	27.7	42.3	44.4	48.8	33.5	33.4	47.5	47.4
48	L			StdDev	1.6	1.1	1.3	1.4	1.5	1.6	1.6	1.3	1.2
48	L			ConfidenzInterval	0.8	0.6	0.6	0.7	0.7	0.8	0.8	0.6	0.6
48	XL	Coat c1	Coat c2	Number	1	1	1	1	1	1	1	1	1
48	XL	=48	=XL	Mean	74.1	26.4	40.6	42.3	47.3	33.0	32.7	46.6	46.5
48	XL			Min	74.1	26.4	40.6	42.3	47.3	33.0	32.7	46.6	46.5
48	XL			Max	74.1	26.4	40.6	42.3	47.3	33.0	32.7	46.6	46.5
48	XL			StdDev									
48	XL			ConfidenzInterval									

PGC 02195 – Men's trouser

STATISTICAL SIZE ANALYSIS

Confidence-A 5%

Trou c1	Trou c2		Body height (in)	Waist girth (in)	Waist band (in)	Buttock girth (in)	Inseam left (in)	Inseam right (in)	Sideseam at waist left (in)	Sideseam at waist right (in)
		Total Cases	8216	8216	8216	8216	8216	8216	8216	8216
27	S	**Number**	0	0	0	0	0	0	0	0
27	S	**Mean**								
27	S	**Min**								
27	S	**Max**								
27	S	**StdDev**								
27	S	**ConfidenzInterval**								
n.	a.	**Number**	43	43	43	43	43	43	43	43
n.	a.	**Mean**	**68.9**	**33.3**	**33.8**	**40.2**	**31.0**	**31.0**	**44.0**	**44.0**
n.	a.	**Min**	**60.6**	**27.3**	**28.9**	**35.3**	**25.9**	**26.1**	**38.2**	**38.2**
n.	a.	**Max**	**75.3**	**41.9**	**41.8**	**46.8**	**34.0**	**33.9**	**47.9**	**48.0**
n.	a.	**StdDev**	**3.1**	**3.8**	**3.5**	**3.0**	**1.9**	**1.9**	**2.3**	**2.3**
n.	a.	**ConfidenzInterval**	**0.9**	**1.1**	**1.1**	**0.9**	**0.6**	**0.6**	**0.7**	**0.7**
27	S	**Number**	0	0	0	0	0	0	0	0
27	S	**Mean**								
27	S	**Min**								
27	S	**Max**								
27	S	**StdDev**								
27	S	**ConfidenzInterval**								
27	R	**Number**	1	1	1	1	1	1	1	1
27	R	**Mean**	**65.7**	**26.3**	**27.4**	**33.0**	**30.6**	**30.7**	**42.9**	**42.9**
27	R	**Min**	**65.7**	**26.3**	**27.4**	**33.0**	**30.6**	**30.7**	**42.9**	**42.9**
27	R	**Max**	**65.7**	**26.3**	**27.4**	**33.0**	**30.6**	**30.7**	**42.9**	**42.9**
27	R	**StdDev**								
27	R	**ConfidenzInterval**								
27	L	**Number**	0	0	0	0	0	0	0	0
27	L	**Mean**								
27	L	**Min**								
27	L	**Max**								
27	L	**StdDev**								
27	L	**ConfidenzInterval**								
27	XL	**Number**	0	0	0	0	0	0	0	0
27	XL	**Mean**								
27	XL	**Min**								
27	XL	**Max**								
27	XL	**StdDev**								
27	XL	**ConfidenzInterval**								
28	S	**Number**	4	4	4	4	4	4	4	4
28	S	**Mean**	**63.7**	**26.8**	**27.1**	**33.8**	**28.6**	**28.7**	**40.6**	**40.6**
28	S	**Min**	**61.8**	**25.9**	**25.5**	**32.7**	**27.7**	**27.7**	**38.9**	**38.9**
28	S	**Max**	**65.7**	**28.0**	**28.4**	**35.2**	**29.4**	**29.6**	**42.5**	**42.6**
28	S	**StdDev**	**1.7**	**0.9**	**1.2**	**1.1**	**0.9**	**1.0**	**1.7**	**1.7**
28	S	**ConfidenzInterval**	**1.6**	**0.9**	**1.2**	**1.1**	**0.9**	**1.0**	**1.7**	**1.7**
28	R	**Number**	4	4	4	4	4	4	4	4
28	R	**Mean**	**63.7**	**27.3**	**29.1**	**34.0**	**26.8**	**26.8**	**39.8**	**39.8**
28	R	**Min**	**61.8**	**25.5**	**27.8**	**33.7**	**25.0**	**25.1**	**38.4**	**38.5**
28	R	**Max**	**65.0**	**28.6**	**30.8**	**34.5**	**27.7**	**27.6**	**40.7**	**40.8**
28	R	**StdDev**	**1.3**	**1.3**	**1.5**	**0.4**	**1.2**	**1.1**	**1.0**	**1.0**
28	R	**ConfidenzInterval**	**1.3**	**1.3**	**1.5**	**0.4**	**1.2**	**1.1**	**1.0**	**1.0**
28	L	**Number**	3	3	3	3	3	3	3	3
28	L	**Mean**	**66.8**	**26.1**	**27.6**	**34.0**	**30.3**	**30.3**	**43.2**	**43.2**
28	L	**Min**	**64.4**	**25.3**	**26.5**	**32.7**	**28.6**	**28.4**	**41.8**	**41.8**
28	L	**Max**	**69.4**	**26.8**	**28.1**	**35.5**	**31.3**	**31.3**	**44.0**	**43.9**
28	L	**StdDev**	**2.5**	**0.7**	**0.9**	**1.4**	**1.5**	**1.6**	**1.2**	**1.2**
28	L	**ConfidenzInterval**	**2.8**	**0.8**	**1.0**	**1.6**	**1.7**	**1.8**	**1.4**	**1.4**
28	XL	**Number**	0	0	0	0	0	0	0	0
28	XL	**Mean**								
28	XL	**Min**								
28	XL	**Max**								
28	XL	**StdDev**								
28	XL	**ConfidenzInterval**								

29	S	Number	13	13	13	13	13	13	13	13
29	S	Mean	64.5	27.5	27.9	34.2	28.8	28.9	41.0	41.0
29	S	Min	62.8	26.8	26.8	33.4	27.2	27.3	39.8	39.9
29	S	Max	66.5	28.4	29.9	35.3	30.1	30.2	42.3	42.5
29	S	StdDev	1.2	0.5	0.8	0.6	0.9	0.9	0.7	0.7
29	S	ConfidenzInterval	0.7	0.3	0.4	0.3	0.5	0.5	0.4	0.4
29	R	Number	29	29	29	29	29	29	29	29
29	R	Mean	65.2	27.7	28.6	34.3	28.8	28.9	41.2	41.4
29	R	Min	62.4	25.7	27.0	31.8	26.1	26.1	38.9	39.0
29	R	Max	67.5	31.2	31.5	36.8	30.8	31.2	42.9	43.2
29	R	StdDev	1.3	1.0	1.1	1.0	1.2	1.2	1.1	1.0
29	R	ConfidenzInterval	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4
29	L	Number	14	14	14	14	14	14	14	14
29	L	Mean	67.9	27.2	28.6	35.1	31.0	31.0	43.5	43.5
29	L	Min	66.2	25.7	27.1	33.4	29.1	29.3	41.3	41.4
29	L	Max	71.2	28.4	30.5	37.2	33.2	33.4	45.8	46.0
29	L	StdDev	1.3	0.7	0.9	1.0	1.1	1.1	1.0	1.1
29	L	ConfidenzInterval	0.7	0.4	0.4	0.5	0.6	0.6	0.5	0.6
29	XL	Number	3	3	3	3	3	3	3	3
29	XL	Mean	69.1	27.3	28.8	34.7	31.8	31.7	44.7	44.7
29	XL	Min	67.2	26.7	28.7	33.5	30.2	30.3	43.5	43.4
29	XL	Max	70.1	27.6	29.1	36.2	33.0	32.7	45.5	45.5
29	XL	StdDev	1.6	0.5	0.2	1.4	1.4	1.3	1.1	1.2
29	XL	ConfidenzInterval	1.9	0.6	0.2	1.6	1.6	1.4	1.2	1.3
30	S	Number	26	26	26	26	26	26	26	26
30	S	Mean	63.4	28.9	29.1	35.0	27.9	28.0	40.1	40.1
30	S	Min	60.8	25.8	27.8	33.5	25.4	25.3	38.1	38.1
30	S	Max	68.1	31.5	31.9	36.2	30.9	30.9	44.1	44.2
30	S	StdDev	1.8	1.2	1.0	0.7	1.4	1.4	1.5	1.5
30	S	ConfidenzInterval	0.7	0.5	0.4	0.3	0.5	0.5	0.6	0.6
30	R	Number	132	132	132	132	132	132	132	132
30	R	Mean	65.0	28.3	28.9	35.5	28.8	28.8	41.2	41.3
30	R	Min	60.5	25.8	26.1	33.1	26.0	26.1	37.6	37.6
30	R	Max	68.4	31.5	34.3	41.2	31.0	31.1	43.8	43.9
30	R	StdDev	1.6	1.0	1.1	1.0	1.1	1.2	1.2	1.2
30	R	ConfidenzInterval	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
30	L	Number	157	157	157	157	157	157	157	157
30	L	Mean	67.6	28.5	29.5	35.6	30.8	30.8	43.3	43.3
30	L	Min	62.4	25.5	26.4	33.4	27.4	27.3	39.4	39.4
30	L	Max	73.5	32.9	35.0	42.2	34.3	34.4	47.6	47.7
30	L	StdDev	1.6	0.9	1.1	0.9	1.3	1.3	1.3	1.3
30	L	ConfidenzInterval	0.3	0.1	0.2	0.1	0.2	0.2	0.2	0.2
30	XL	Number	69	69	69	69	69	69	69	69
30	XL	Mean	70.4	28.7	30.1	36.1	32.6	32.6	45.4	45.4
30	XL	Min	64.0	26.4	27.5	34.4	29.2	29.3	40.7	40.8
30	XL	Max	73.8	32.5	33.6	38.6	35.2	35.1	49.4	49.4
30	XL	StdDev	2.0	1.0	1.1	0.8	1.4	1.4	1.6	1.6
30	XL	ConfidenzInterval	0.5	0.2	0.3	0.2	0.3	0.3	0.4	0.4
31	S	Number	13	13	13	13	13	13	13	13
31	S	Mean	62.9	29.9	30.1	36.1	27.3	27.3	39.4	39.4
31	S	Min	58.7	28.0	27.9	34.7	25.2	25.3	36.0	36.0
31	S	Max	65.7	30.9	31.8	38.1	28.9	28.9	41.5	41.6
31	S	StdDev	1.9	0.8	1.2	1.1	0.9	0.9	1.4	1.4
31	S	ConfidenzInterval	1.0	0.4	0.7	0.6	0.5	0.5	0.8	0.8
31	R	Number	199	199	199	199	199	199	199	199
31	R	Mean	65.3	29.4	29.8	36.3	28.9	29.0	41.3	41.4
31	R	Min	59.0	26.2	26.6	33.7	23.5	23.6	35.5	35.4
31	R	Max	69.6	33.0	33.4	38.6	31.5	31.5	43.9	44.2
31	R	StdDev	1.7	1.0	1.0	0.8	1.3	1.3	1.4	1.4
31	R	ConfidenzInterval	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2
31	L	Number	381	381	381	381	381	381	381	381
31	L	Mean	68.0	29.2	30.3	36.5	30.7	30.7	43.4	43.4
31	L	Min	61.5	26.6	27.7	34.3	26.7	26.8	38.5	38.4
31	L	Max	74.5	32.1	32.9	39.3	34.8	34.8	48.1	48.3
31	L	StdDev	1.8	0.9	1.0	0.8	1.3	1.3	1.4	1.4
31	L	ConfidenzInterval	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1

31	XL	Number	0	0	0	0	0	0	0	0
31	XL	Mean								
31	XL	Min								
31	XL	Max								
31	XL	StdDev								
31	XL	ConfidenzInterval								
32	S	Number	34	34	34	34	34	34	34	34
32	S	Mean	63.6	30.7	30.5	36.7	27.7	27.7	39.9	39.9
32	S	Min	61.2	28.5	28.1	34.9	25.6	25.6	37.9	38.0
32	S	Max	67.5	33.7	33.4	40.5	31.8	31.8	44.0	44.1
32	S	StdDev	1.4	1.0	1.0	1.1	1.1	1.1	1.2	1.2
32	S	ConfidenzInterval	0.5	0.3	0.3	0.4	0.4	0.4	0.4	0.4
32	R	Number	252	252	252	252	252	252	252	252
32	R	Mean	65.5	30.4	30.8	37.4	28.8	28.9	41.3	41.3
32	R	Min	59.0	27.7	27.8	35.0	24.1	23.8	36.3	36.3
32	R	Max	69.9	33.1	42.9	48.2	33.5	33.4	45.4	45.2
32	R	StdDev	1.7	1.0	1.4	1.3	1.3	1.3	1.3	1.3
32	R	ConfidenzInterval	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2
32	L	Number	529	529	529	529	529	529	529	529
32	L	Mean	68.0	30.2	31.0	37.4	30.5	30.6	43.3	43.3
32	L	Min	62.4	27.4	28.2	31.8	26.7	26.5	39.2	39.3
32	L	Max	76.0	40.1	40.8	43.7	36.4	36.5	49.5	49.5
32	L	StdDev	1.7	1.0	1.1	0.9	1.3	1.3	1.3	1.3
32	L	ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
32	XL	Number	442	442	442	442	442	442	442	442
32	XL	Mean	70.0	30.1	31.3	37.6	32.0	32.0	44.9	44.9
32	XL	Min	63.6	27.1	28.5	35.1	27.3	27.3	39.6	39.6
32	XL	Max	77.6	33.6	35.1	40.4	37.9	38.1	50.8	50.7
32	XL	StdDev	2.1	1.0	1.1	0.9	1.6	1.6	1.7	1.7
32	XL	ConfidenzInterval	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2
33	S	Number	4	4	4	4	4	4	4	4
33	S	Mean	65.0	31.5	31.2	37.4	28.4	28.5	41.2	41.2
33	S	Min	61.5	30.8	29.4	35.9	26.4	27.0	39.7	39.7
33	S	Max	67.5	32.2	32.9	38.3	30.1	30.1	43.2	43.1
33	S	StdDev	2.5	0.8	1.5	1.1	1.6	1.4	1.6	1.6
33	S	ConfidenzInterval	2.5	0.8	1.4	1.1	1.6	1.4	1.6	1.5
33	R	Number	186	186	186	186	186	186	186	186
33	R	Mean	65.7	31.5	31.7	38.0	29.0	29.0	41.5	41.5
33	R	Min	60.8	28.2	29.0	35.0	24.8	24.6	37.7	37.7
33	R	Max	73.2	36.9	39.8	42.8	32.7	32.8	46.2	46.2
33	R	StdDev	1.7	1.0	1.2	1.0	1.3	1.3	1.3	1.3
33	R	ConfidenzInterval	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.2
33	L	Number	477	477	477	477	477	477	477	477
33	L	Mean	67.6	31.3	31.7	38.3	30.3	30.3	42.9	43.0
33	L	Min	60.0	28.7	28.5	36.0	24.2	24.1	36.9	36.8
33	L	Max	74.0	37.2	40.1	48.4	36.1	35.9	47.9	47.9
33	L	StdDev	1.8	1.0	1.2	1.0	1.4	1.4	1.4	1.4
33	L	ConfidenzInterval	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
33	XL	Number	700	700	700	700	700	700	700	700
33	XL	Mean	70.2	31.0	32.0	38.5	31.9	31.9	45.0	45.0
33	XL	Min	62.1	27.7	28.4	35.6	27.1	27.4	39.7	39.7
33	XL	Max	77.6	34.1	36.5	43.4	36.6	36.7	49.6	49.7
33	XL	StdDev	2.1	1.0	1.2	0.9	1.5	1.5	1.6	1.6
33	XL	ConfidenzInterval	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
34	S	Number	0	0	0	0	0	0	0	0
34	S	Mean								
34	S	Min								
34	S	Max								
34	S	StdDev								
34	S	ConfidenzInterval								
34	R	Number	125	125	125	125	125	125	125	125
34	R	Mean	65.8	32.6	32.8	38.9	28.7	28.7	41.4	41.4
34	R	Min	60.6	28.6	27.7	35.5	25.6	25.7	37.7	37.7
34	R	Max	71.6	36.2	37.9	45.4	31.9	31.8	46.6	46.5
34	R	StdDev	2.1	1.2	1.2	1.1	1.3	1.3	1.5	1.5
34	R	ConfidenzInterval	0.4	0.2	0.2	0.2	0.2	0.2	0.3	0.3

34	L	Number	440	440	440	440	440	440	440	440
34	L	Mean	68.0	32.3	32.8	39.3	30.3	30.3	43.1	43.1
34	L	Min	62.1	29.4	28.9	36.6	26.0	25.8	38.8	38.8
34	L	Max	76.6	35.8	36.2	42.8	35.3	35.3	51.1	49.7
34	L	StdDev	2.0	1.0	1.1	0.9	1.4	1.4	1.6	1.5
34	L	ConfidenzInterval	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
34	XL	Number	831	831	831	831	831	831	831	831
34	XL	Mean	70.2	32.1	33.1	39.6	31.7	31.7	44.8	44.8
34	XL	Min	62.4	27.2	29.2	36.9	25.5	25.4	38.0	38.0
34	XL	Max	77.6	36.7	42.4	46.7	36.9	37.3	50.4	51.3
34	XL	StdDev	2.3	1.1	1.3	1.0	1.7	1.7	1.8	1.8
34	XL	ConfidenzInterval	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
35	S	Number	0	0	0	0	0	0	0	0
35	S	Mean								
35	S	Min								
35	S	Max								
35	S	StdDev								
35	S	ConfidenzInterval								
35	R	Number	94	94	94	94	94	94	94	94
35	R	Mean	66.3	33.4	33.6	39.9	28.9	28.9	41.7	41.7
35	R	Min	62.5	30.9	30.1	37.9	25.8	25.9	38.8	38.8
35	R	Max	70.6	36.0	35.9	41.7	32.5	32.6	45.3	45.3
35	R	StdDev	1.9	1.1	1.0	0.8	1.2	1.2	1.4	1.4
35	R	ConfidenzInterval	0.4	0.2	0.2	0.2	0.3	0.3	0.3	0.3
35	L	Number	401	401	401	401	401	401	401	401
35	L	Mean	68.3	33.2	33.7	40.2	30.5	30.5	43.3	43.3
35	L	Min	62.8	27.9	29.1	37.0	26.2	26.3	38.9	38.9
35	L	Max	74.8	36.6	40.8	45.3	35.8	35.8	48.6	51.1
35	L	StdDev	2.1	1.2	1.2	1.0	1.5	1.5	1.7	1.7
35	L	ConfidenzInterval	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2
35	XL	Number	0	0	0	0	0	0	0	0
35	XL	Mean								
35	XL	Min								
35	XL	Max								
35	XL	StdDev								
35	XL	ConfidenzInterval								
36	S	Number	1	1	1	1	1	1	1	1
36	S	Mean	69.6	32.0	34.3	40.8	30.9	31.0	44.8	44.9
36	S	Min	69.6	32.0	34.3	40.8	30.9	31.0	44.8	44.9
36	S	Max	69.6	32.0	34.3	40.8	30.9	31.0	44.8	44.9
36	S	StdDev								
36	S	ConfidenzInterval								
36	R	Number	45	45	45	45	45	45	45	45
36	R	Mean	66.5	34.6	34.6	40.0	29.4	29.4	41.9	41.9
36	R	Min	62.4	32.0	32.3	37.3	25.9	25.8	39.0	38.9
36	R	Max	69.6	36.6	36.7	42.1	32.6	32.3	44.9	45.0
36	R	StdDev	1.6	1.1	1.0	1.1	1.3	1.3	1.4	1.4
36	R	ConfidenzInterval	0.5	0.3	0.3	0.3	0.4	0.4	0.4	0.4
36	L	Number	199	199	199	199	199	199	199	199
36	L	Mean	67.8	34.2	34.5	40.8	30.0	30.0	42.9	42.9
36	L	Min	63.4	30.2	29.8	37.1	25.2	25.1	38.3	38.3
36	L	Max	75.9	37.4	38.2	48.1	36.3	36.4	49.0	51.6
36	L	StdDev	2.0	1.2	1.2	1.2	1.5	1.5	1.6	1.7
36	L	ConfidenzInterval	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
36	XL	Number	1044	1044	1044	1044	1044	1044	1044	1044
36	XL	Mean	70.1	33.9	34.7	41.1	31.5	31.5	44.6	44.6
36	XL	Min	63.1	29.4	30.3	37.6	26.8	26.9	39.7	39.7
36	XL	Max	77.6	38.3	39.3	45.0	37.1	37.2	50.7	50.5
36	XL	StdDev	2.4	1.4	1.3	1.0	1.7	1.6	1.8	1.8
36	XL	ConfidenzInterval	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
37	S	Number	1	1	1	1	1	1	1	1
37	S	Mean	67.8	33.8	35.2	41.1	28.5	28.6	42.4	42.5
37	S	Min	67.8	33.8	35.2	41.1	28.5	28.6	42.4	42.5
37	S	Max	67.8	33.8	35.2	41.1	28.5	28.6	42.4	42.5
37	S	StdDev								
37	S	ConfidenzInterval								
37	R	Number	19	19	19	19	19	19	19	19
37	R	Mean	67.2	35.9	35.0	41.4	29.4	29.4	42.3	42.3
37	R	Min	63.7	34.3	33.7	40.2	26.9	27.1	39.4	39.4
37	R	Max	71.3	38.0	36.4	43.7	32.5	32.5	45.3	45.4
37	R	StdDev	2.2	1.0	0.7	0.9	1.5	1.4	1.7	1.8
37	R	ConfidenzInterval	1.0	0.4	0.3	0.4	0.7	0.6	0.8	0.8

37	L	Number	160	160	160	160	160	160	160	160
37	L	Mean	68.3	35.4	35.6	41.6	30.2	30.2	43.1	43.1
37	L	Min	62.7	28.9	29.5	35.8	26.6	26.5	39.1	39.0
37	L	Max	74.5	38.6	37.9	50.8	36.6	36.7	49.1	49.1
37	L	StdDev	2.3	1.5	1.2	1.5	1.6	1.6	1.8	1.8
37	L	ConfidenzInterval	0.4	0.2	0.2	0.2	0.3	0.3	0.3	0.3
37	XL	Number	0	0	0	0	0	0	0	0
37	XL	Mean								
37	XL	Min								
37	XL	Max								
37	XL	StdDev								
37	XL	ConfidenzInterval								
38	S	Number	0	0	0	0	0	0	0	0
38	S	Mean								
38	S	Min								
38	S	Max								
38	S	StdDev								
38	S	ConfidenzInterval								
38	R	Number	21	21	21	21	21	21	21	21
38	R	Mean	67.4	36.2	36.2	42.1	29.1	29.2	42.1	42.1
38	R	Min	65.0	33.2	34.8	40.2	27.4	27.4	40.6	40.6
38	R	Max	70.4	39.8	38.0	44.5	30.7	30.8	44.4	44.3
38	R	StdDev	1.3	1.4	0.9	1.0	0.8	0.8	1.0	1.0
38	R	ConfidenzInterval	0.6	0.6	0.4	0.4	0.3	0.3	0.4	0.4
38	L	Number	84	84	84	84	84	84	84	84
38	L	Mean	68.1	36.2	36.4	42.1	30.0	30.0	43.0	43.0
38	L	Min	63.5	31.6	32.9	39.1	27.1	27.1	39.5	39.7
38	L	Max	74.8	40.4	39.2	44.8	34.4	34.5	47.3	47.1
38	L	StdDev	2.0	1.5	1.3	1.1	1.4	1.4	1.6	1.6
38	L	ConfidenzInterval	0.4	0.3	0.3	0.2	0.3	0.3	0.4	0.3
38	XL	Number	643	643	643	643	643	643	643	643
38	XL	Mean	70.4	35.9	36.5	42.6	31.5	31.5	44.7	44.7
38	XL	Min	63.4	30.9	32.2	39.4	26.1	26.1	40.0	40.1
38	XL	Max	78.5	40.4	40.5	45.9	37.0	37.0	50.7	50.7
38	XL	StdDev	2.3	1.5	1.3	1.1	1.6	1.6	1.8	1.8
38	XL	ConfidenzInterval	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
39	S	Number	0	0	0	0	0	0	0	0
39	S	Mean								
39	S	Min								
39	S	Max								
39	S	StdDev								
39	S	ConfidenzInterval								
39	R	Number	3	3	3	3	3	3	3	3
39	R	Mean	66.3	35.8	37.4	44.1	29.0	28.8	41.9	42.0
39	R	Min	64.7	34.9	36.9	43.9	28.4	28.4	41.7	41.8
39	R	Max	68.1	37.3	37.9	44.5	29.9	29.5	42.4	42.5
39	R	StdDev	1.7	1.3	0.5	0.3	0.8	0.6	0.4	0.4
39	R	ConfidenzInterval	1.9	1.5	0.6	0.4	0.9	0.6	0.5	0.4
39	L	Number	50	50	50	50	50	50	50	50
39	L	Mean	69.9	37.7	37.7	43.1	30.9	30.9	44.2	44.2
39	L	Min	62.8	34.8	35.2	41.8	26.9	27.0	38.6	38.5
39	L	Max	75.3	41.2	40.2	45.3	35.7	35.6	49.0	52.1
39	L	StdDev	2.4	1.4	1.0	0.8	1.8	1.8	2.0	2.2
39	L	ConfidenzInterval	0.7	0.4	0.3	0.2	0.5	0.5	0.6	0.6
39	XL	Number	0	0	0	0	0	0	0	0
39	XL	Mean								
39	XL	Min								
39	XL	Max								
39	XL	StdDev								
39	XL	ConfidenzInterval								
40	S	Number	0	0	0	0	0	0	0	0
40	S	Mean								
40	S	Min								
40	S	Max								
40	S	StdDev								
40	S	ConfidenzInterval								
40	R	Number	3	3	3	3	3	3	3	3
40	R	Mean	68.6	38.0	37.8	43.3	29.3	29.4	42.7	42.7
40	R	Min	65.7	36.2	37.6	42.2	27.2	27.4	39.6	39.7
40	R	Max	70.9	39.2	38.0	44.2	30.9	31.0	45.1	45.0
40	R	StdDev	2.7	1.6	0.2	1.0	1.9	1.8	2.8	2.7
40	R	ConfidenzInterval	3.0	1.8	0.2	1.1	2.1	2.1	3.2	3.1

40	L	Number	32	32	32	32	32	32	32	32
40	L	Mean	70.1	38.1	38.6	44.0	30.9	30.8	44.4	44.4
40	L	Min	64.7	35.4	35.0	40.4	27.0	27.2	39.8	39.9
40	L	Max	74.1	42.3	42.9	46.3	34.1	34.1	47.4	47.3
40	L	StdDev	2.2	1.7	1.8	1.3	1.6	1.6	1.7	1.7
40	L	ConfidenzInterval	0.8	0.6	0.6	0.4	0.6	0.6	0.6	0.6
40	XL	Number	253	253	253	253	253	253	253	253
40	XL	Mean	71.1	37.5	38.1	44.4	31.6	31.6	45.2	45.1
40	XL	Min	64.4	33.1	33.5	41.6	27.1	27.3	39.8	39.9
40	XL	Max	78.2	42.2	41.9	48.4	36.7	36.7	50.7	50.3
40	XL	StdDev	2.3	1.6	1.5	1.2	1.7	1.7	1.8	1.8
40	XL	ConfidenzInterval	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.2
41	S	Number	0	0	0	0	0	0	0	0
41	S	Mean								
41	S	Min								
41	S	Max								
41	S	StdDev								
41	S	ConfidenzInterval								
41	R	Number	0	0	0	0	0	0	0	0
41	R	Mean								
41	R	Min								
41	R	Max								
41	R	StdDev								
41	R	ConfidenzInterval								
41	L	Number	0	0	0	0	0	0	0	0
41	L	Mean								
41	L	Min								
41	L	Max								
41	L	StdDev								
41	L	ConfidenzInterval								
41	XL	Number	0	0	0	0	0	0	0	0
41	XL	Mean								
41	XL	Min								
41	XL	Max								
41	XL	StdDev								
41	XL	ConfidenzInterval								
42	S	Number	0	0	0	0	0	0	0	0
42	S	Mean								
42	S	Min								
42	S	Max								
42	S	StdDev								
42	S	ConfidenzInterval								
42	R	Number	0	0	0	0	0	0	0	0
42	R	Mean								
42	R	Min								
42	R	Max								
42	R	StdDev								
42	R	ConfidenzInterval								
42	L	Number	24	24	24	24	24	24	24	24
42	L	Mean	71.2	38.5	39.0	45.4	32.2	32.2	45.7	45.7
42	L	Min	65.9	32.5	36.0	42.7	29.5	29.5	42.5	42.5
42	L	Max	74.1	42.3	41.8	48.8	35.2	35.2	48.9	48.7
42	L	StdDev	2.1	2.0	1.4	1.4	1.8	1.7	1.5	1.5
42	L	ConfidenzInterval	0.8	0.8	0.5	0.6	0.7	0.7	0.6	0.6
42	XL	Number	20	20	20	20	20	20	20	20
42	XL	Mean	71.9	38.9	39.6	45.9	32.0	32.1	45.9	46.0
42	XL	Min	69.4	34.6	35.9	43.7	27.7	27.7	43.7	43.7
42	XL	Max	76.0	41.6	42.6	47.9	34.8	34.8	48.8	49.1
42	XL	StdDev	2.0	2.1	1.9	1.2	1.7	1.7	1.5	1.6
42	XL	ConfidenzInterval	0.9	0.9	0.8	0.5	0.8	0.7	0.7	0.7
44	S	Number	0	0	0	0	0	0	0	0
44	S	Mean								
44	S	Min								
44	S	Max								
44	S	StdDev								
44	S	ConfidenzInterval								

44	R	**Number**	0	0	0	0	0	0	0	0
44	R	**Mean**								
44	R	**Min**								
44	R	**Max**								
44	R	**StdDev**								
44	R	**ConfidenzInterval**								
44	L	**Number**	1	1	1	1	1	1	1	1
44	L	**Mean**	**67.2**	**34.0**	**34.4**	**48.4**	**32.0**	**32.0**	**45.7**	**44.0**
44	L	**Min**	**67.2**	**34.0**	**34.4**	**48.4**	**32.0**	**32.0**	**45.7**	**44.0**
44	L	**Max**	**67.2**	**34.0**	**34.4**	**48.4**	**32.0**	**32.0**	**45.7**	**44.0**
44	L	**StdDev**								
44	L	**ConfidenzInterval**								
44	XL	**Number**	7	7	7	7	7	7	7	7
44	XL	**Mean**	**71.9**	**39.6**	**40.0**	**46.4**	**32.4**	**32.5**	**46.2**	**46.2**
44	XL	**Min**	**68.4**	**36.9**	**37.7**	**45.6**	**29.8**	**30.2**	**43.9**	**43.8**
44	XL	**Max**	**75.0**	**42.1**	**44.4**	**47.6**	**34.1**	**34.1**	**47.8**	**47.8**
44	XL	**StdDev**	**2.6**	**1.9**	**2.3**	**0.8**	**1.6**	**1.5**	**1.7**	**1.7**
44	XL	**ConfidenzInterval**	**1.9**	**1.4**	**1.7**	**0.6**	**1.2**	**1.1**	**1.2**	**1.3**

PGC 21111 – Men's All Weather Coat

STATISTICAL SIZE ANALYSIS

Confidence-Alpha = 5%

Coat AW c1	Coat AW c2				Body height (in)	Head circumference (in)	Mid neck girth (in)	Bust/chest girth (in)	Bust/chest girth (horizontal) (in)	Arm length left (in)	Waist girth (in)	Waist band (in)
				Total Cases	8217	8217	8217	8217	8217	8217	8217	8217
		Coat AW c1	Coat AW c2	Number	8219	8219	8219	8219	8219	8219	8219	8219
0	0			Mean	68.8	22.7	15.1	38.8	39.2	24.7	32.3	33.0
0	0			Min	58.7	10.5	12.5	30.2	30.2	19.8	25.3	25.5
0	0			Max	79.8	25.5	19.7	51.0	51.6	30.3	44.7	45.3
0	0			StdDev	2.7	0.9	0.8	2.8	2.7	1.3	2.7	2.6
0	0			ConfidenzInterval	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1
n.	a.	Coat AW c1	Coat AW c2	Number	235	235	235	235	235	235	235	235
n.	a.	=n.	=a.	Mean	68.4	22.8	15.3	39.3	39.7	24.6	32.9	33.4
n.	a.			Min	59.3	15.0	13.2	32.0	32.0	21.4	26.0	27.9
n.	a.			Max	78.2	24.8	17.7	47.9	47.9	29.2	42.1	41.4
n.	a.			StdDev	2.8	1.0	0.8	2.7	2.6	1.3	2.6	2.4
n.	a.			ConfidenzInterval	0.4	0.1	0.1	0.3	0.3	0.2	0.3	0.3
30	R	Coat AW c1	Coat AW c2	Number	1	1	1	1	1	1	1	1
30	R	=30	=R	Mean	66.9	22.1	14.3	35.1	35.2	24.2	29.1	28.6
30	R			Min	66.9	22.1	14.3	35.1	35.2	24.2	29.1	28.6
30	R			Max	66.9	22.1	14.3	35.1	35.2	24.2	29.1	28.6
30	R			StdDev								
30	R			ConfidenzInterval								
34	XS	Coat AW c1	Coat AW c2	Number	1	1	1	1	1	1	1	1
34	XS	=34	=XS	Mean	58.7	21.1	13.8	33.2	34.7	20.8	28.4	28.7
34	XS			Min	58.7	21.1	13.8	33.2	34.7	20.8	28.4	28.7
34	XS			Max	58.7	21.1	13.8	33.2	34.7	20.8	28.4	28.7
34	XS			StdDev								
34	XS			ConfidenzInterval								
34	S	Coat AW c1	Coat AW c2	Number	6	6	6	6	6	6	6	6
34	S	=34	=S	Mean	64.5	21.9	13.7	33.9	34.4	22.4	28.1	29.0
34	S			Min	63.7	20.4	13.0	31.8	32.5	21.1	26.8	27.5
34	S			Max	66.0	22.7	15.0	36.1	37.1	23.0	30.1	31.4
34	S			StdDev	0.8	0.8	0.7	1.8	1.8	0.7	1.2	1.3
34	S			ConfidenzInterval	0.6	0.7	0.6	1.4	1.4	0.6	1.0	1.1
34	R	Coat AW c1	Coat AW c2	Number	9	9	9	9	9	9	9	9
34	R	=34	=R	Mean	66.3	21.7	13.3	33.6	34.1	23.5	27.1	28.8
34	R			Min	64.7	21.0	12.6	31.6	32.8	22.4	25.5	27.6
34	R			Max	68.1	22.4	15.0	35.4	36.1	25.0	29.8	31.0
34	R			StdDev	1.2	0.5	0.8	1.3	1.1	0.8	1.4	1.2
34	R			ConfidenzInterval	0.8	0.3	0.5	0.8	0.7	0.5	0.9	0.8
34	L	Coat AW c1	Coat AW c2	Number	10	10	10	10	10	10	10	10
34	L	=34	=L	Mean	68.4	21.6	13.8	34.9	35.7	24.9	28.4	29.3
34	L			Min	66.3	13.9	13.4	33.8	34.6	23.6	27.3	28.0
34	L			Max	69.7	23.1	14.4	37.1	37.2	25.7	29.4	30.8
34	L			StdDev	1.3	2.7	0.3	1.0	1.0	0.7	0.7	1.0
34	L			ConfidenzInterval	0.8	1.7	0.2	0.6	0.6	0.5	0.5	0.7
34	XL	Coat AW c1	Coat AW c2	Number	0	0	0	0	0	0	0	0
34	XL	=34	=XL	Mean								
34	XL			Min								
34	XL			Max								
34	XL			StdDev								
34	XL			ConfidenzInterval								
36	XS	Coat AW c1	Coat AW c2	Number	14	14	14	14	14	14	14	14
36	XS	=36	=XS	Mean	61.6	22.2	14.1	35.0	35.3	21.5	29.2	29.5
36	XS			Min	60.2	20.8	13.2	33.2	33.5	20.0	26.9	25.5
36	XS			Max	64.0	23.4	15.1	37.9	38.0	22.9	32.4	34.2
36	XS			StdDev	1.0	0.8	0.6	1.3	1.2	0.9	1.5	2.0
36	XS			ConfidenzInterval	0.5	0.4	0.3	0.7	0.6	0.5	0.8	1.1
36	S	Coat AW c1	Coat AW c2	Number	69	69	69	69	69	69	69	69
36	S	=36	=S	Mean	63.6	21.8	14.1	34.9	35.3	22.2	28.8	29.0
36	S			Min	61.5	13.0	12.8	31.7	32.0	19.8	26.2	26.4
36	S			Max	66.2	23.0	15.7	37.8	38.7	24.0	31.0	31.6
36	S			StdDev	1.0	1.3	0.6	1.4	1.3	0.6	1.1	1.1
36	S			ConfidenzInterval	0.2	0.3	0.1	0.3	0.3	0.1	0.2	0.3

36	R	Coat AW c1	Coat AW c2	Number	166	166	166	166	166	166	166	166
36	R	=36	=R	Mean	66.6	22.0	14.0	34.8	35.3	23.6	28.6	29.7
36	R			Min	63.1	10.5	12.5	30.2	30.2	20.9	25.3	26.5
36	R			Max	69.4	23.7	15.4	38.4	38.6	25.0	32.3	33.4
36	R			StdDev	1.0	1.3	0.5	1.5	1.4	0.7	1.2	1.3
36	R			ConfidenzInterval	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2
36	L	Coat AW c1	Coat AW c2	Number	136	136	136	136	136	136	136	136
36	L	=36	=L	Mean	68.4	22.2	14.1	35.0	35.5	24.4	28.9	30.3
36	L			Min	64.7	12.8	13.2	31.7	32.8	21.5	26.2	27.2
36	L			Max	71.9	24.1	15.4	38.4	39.0	26.3	33.7	34.1
36	L			StdDev	1.3	1.1	0.4	1.4	1.3	0.7	1.1	1.3
36	L			ConfidenzInterval	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2
36	XL	Coat AW c1	Coat AW c2	Number	7	7	7	7	7	7	7	7
36	XL	=36	=XL	Mean	71.4	22.5	13.9	34.4	35.3	25.7	28.7	30.4
36	XL			Min	68.8	21.7	13.6	33.4	34.3	24.2	27.4	28.9
36	XL			Max	74.1	23.5	14.2	35.8	38.0	26.7	30.1	32.4
36	XL			StdDev	1.6	0.6	0.2	0.9	1.3	1.0	1.0	1.1
36	XL			ConfidenzInterval	1.2	0.5	0.2	0.6	1.0	0.7	0.7	0.8
38	XS	Coat AW c1	Coat AW c2	Number	30	30	30	30	30	30	30	30
38	XS	=38	=XS	Mean	62.2	22.4	14.8	36.5	36.8	21.6	30.3	30.1
38	XS			Min	59.0	21.4	13.3	33.8	33.9	20.2	27.6	27.9
38	XS			Max	64.4	23.7	16.1	38.8	39.1	23.1	33.0	32.6
38	XS			StdDev	1.4	0.5	0.7	1.4	1.3	0.7	1.3	1.2
38	XS			ConfidenzInterval	0.5	0.2	0.2	0.5	0.5	0.3	0.5	0.4
38	S	Coat AW c1	Coat AW c2	Number	269	269	269	269	269	269	269	269
38	S	=38	=S	Mean	64.6	22.1	14.5	36.3	36.6	22.9	30.0	30.4
38	S			Min	61.1	12.7	12.8	30.4	30.4	20.6	25.9	26.1
38	S			Max	67.8	24.0	16.7	40.4	40.3	24.7	33.9	37.4
38	S			StdDev	1.1	1.0	0.6	1.7	1.6	0.7	1.6	1.7
38	S			ConfidenzInterval	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2
38	R	Coat AW c1	Coat AW c2	Number	771	771	771	771	771	771	771	771
38	R	=38	=R	Mean	66.7	22.3	14.5	36.7	37.1	23.7	30.3	30.9
38	R			Min	60.2	14.4	12.8	31.4	32.5	20.1	26.2	26.4
38	R			Max	70.6	24.3	16.3	42.6	42.9	26.1	38.4	37.8
38	R			StdDev	1.2	0.8	0.6	1.7	1.6	0.7	1.4	1.5
38	R			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1
38	L	Coat AW c1	Coat AW c2	Number	608	608	608	608	608	608	608	608
38	L	=38	=L	Mean	69.6	22.5	14.5	36.4	36.9	25.0	30.0	31.3
38	L			Min	65.2	16.8	13.0	31.3	31.9	22.3	25.5	27.5
38	L			Max	73.8	24.5	16.4	42.1	42.1	27.0	34.0	37.7
38	L			StdDev	1.2	0.7	0.5	1.6	1.5	0.8	1.2	1.4
38	L			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1
38	XL	Coat AW c1	Coat AW c2	Number	150	150	150	150	150	150	150	150
38	XL	=38	=XL	Mean	71.2	22.6	14.5	36.3	36.8	25.9	29.9	31.3
38	XL			Min	59.0	12.8	12.9	32.2	33.0	21.1	26.5	28.3
38	XL			Max	75.3	24.3	16.0	39.7	40.2	27.6	32.9	34.7
38	XL			StdDev	1.8	1.1	0.6	1.6	1.5	0.9	1.3	1.4
38	XL			ConfidenzInterval	0.3	0.2	0.1	0.3	0.2	0.1	0.2	0.2
40	XS	Coat AW c1	Coat AW c2	Number	42	42	42	42	42	42	42	42
40	XS	=40	=XS	Mean	62.8	22.4	15.2	38.3	38.6	21.9	32.1	31.8
40	XS			Min	60.5	21.0	13.9	35.1	36.0	20.2	28.9	28.7
40	XS			Max	66.2	24.7	16.4	41.6	41.6	23.1	36.6	35.1
40	XS			StdDev	1.2	0.8	0.6	1.4	1.4	0.7	1.6	1.5
40	XS			ConfidenzInterval	0.4	0.2	0.2	0.4	0.4	0.2	0.5	0.4
40	S	Coat AW c1	Coat AW c2	Number	240	240	240	240	240	240	240	240
40	S	=40	=S	Mean	64.8	22.4	15.1	38.6	39.0	23.0	32.1	32.1
40	S			Min	60.8	10.7	13.7	33.6	34.4	21.1	28.5	27.7
40	S			Max	70.6	23.9	16.9	44.1	44.0	25.3	36.4	37.6
40	S			StdDev	1.2	1.0	0.6	1.7	1.6	0.7	1.6	1.7
40	S			ConfidenzInterval	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2
40	R	Coat AW c1	Coat AW c2	Number	970	970	970	970	970	970	970	970
40	R	=40	=R	Mean	67.5	22.6	15.0	38.2	38.6	24.1	31.8	32.3
40	R			Min	62.4	13.5	13.3	32.2	32.6	21.6	26.8	27.3
40	R			Max	76.0	24.5	17.4	45.1	45.8	28.9	40.1	41.1
40	R			StdDev	1.2	0.8	0.6	1.7	1.6	0.7	1.6	1.7
40	R			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1

40	L	Coat AW c1	Coat AW c2	Number	1015	1015	1015	1015	1015	1015	1015	1015
40	L	=40	=L	Mean	69.7	22.7	15.0	38.3	38.9	25.1	31.8	32.7
40	L			Min	66.2	14.4	13.2	32.7	34.1	22.5	27.2	27.8
40	L			Max	73.5	24.5	18.6	44.9	44.8	28.0	37.5	42.9
40	L			StdDev	1.2	0.8	0.6	1.7	1.6	0.7	1.5	1.6
40	L			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1
40	XL	Coat AW c1	Coat AW c2	Number	391	391	391	391	391	391	391	391
40	XL	=40	=XL	Mean	72.2	22.9	14.9	37.9	38.5	26.1	31.4	32.9
40	XL			Min	68.1	15.0	12.7	31.6	31.9	23.7	27.5	28.1
40	XL			Max	77.2	24.6	16.7	42.6	42.7	29.2	37.1	38.7
40	XL			StdDev	1.3	0.9	0.6	1.7	1.7	0.8	1.5	1.6
40	XL			ConfidenzInterval	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2
42	XS	Coat AW c1	Coat AW c2	Number	14	14	14	14	14	14	14	14
42	XS	=42	=XS	Mean	63.7	22.6	15.5	40.5	40.6	22.2	34.4	33.9
42	XS			Min	60.6	21.5	14.8	38.2	38.2	20.8	30.4	29.8
42	XS			Max	70.4	23.5	16.2	44.1	44.1	26.2	39.9	37.2
42	XS			StdDev	2.3	0.5	0.4	1.8	1.7	1.3	2.2	2.1
42	XS			ConfidenzInterval	1.2	0.3	0.2	0.9	0.9	0.7	1.2	1.1
42	S	Coat AW c1	Coat AW c2	Number	164	164	164	164	164	164	164	164
42	S	=42	=S	Mean	65.5	22.8	15.5	40.0	40.5	23.3	33.5	33.4
42	S			Min	61.6	17.6	14.0	35.2	36.4	21.5	29.5	27.8
42	S			Max	68.4	24.5	18.3	44.2	44.6	25.3	38.1	38.6
42	S			StdDev	1.2	0.7	0.6	1.7	1.6	0.8	1.7	1.9
42	S			ConfidenzInterval	0.2	0.1	0.1	0.3	0.3	0.1	0.3	0.3
42	R	Coat AW c1	Coat AW c2	Number	588	588	588	588	588	588	588	588
42	R	=42	=R	Mean	67.6	22.8	15.4	40.0	40.5	24.3	33.7	33.9
42	R			Min	64.7	14.3	13.6	33.1	33.4	22.2	28.7	28.2
42	R			Max	76.9	24.6	17.5	45.1	45.0	29.4	38.4	40.3
42	R			StdDev	1.2	0.8	0.6	1.7	1.6	0.8	1.8	1.9
42	R			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2
42	L	Coat AW c1	Coat AW c2	Number	711	711	711	711	711	711	711	711
42	L	=42	=L	Mean	70.1	22.9	15.5	40.2	40.6	25.3	33.7	34.4
42	L			Min	65.9	13.5	13.9	34.3	34.3	22.9	29.2	28.7
42	L			Max	74.8	25.5	17.8	45.2	45.2	27.5	39.2	40.8
42	L			StdDev	1.1	1.0	0.6	1.7	1.6	0.7	1.6	1.8
42	L			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1
42	XL	Coat AW c1	Coat AW c2	Number	434	434	434	434	434	434	434	434
42	XL	=42	=XL	Mean	72.8	23.1	15.3	39.7	40.3	26.6	33.1	34.3
42	XL			Min	65.2	12.1	13.5	33.9	34.0	23.9	28.9	29.3
42	XL			Max	77.6	25.1	17.6	45.5	46.3	29.8	39.0	39.6
42	XL			StdDev	1.5	1.0	0.7	2.0	1.9	0.9	1.9	1.9
42	XL			ConfidenzInterval	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2
44	XS	Coat AW c1	Coat AW c2	Number	0	0	0	0	0	0	0	0
44	XS	=44	=XS	Mean								
44	XS			Min								
44	XS			Max								
44	XS			StdDev								
44	XS			ConfidenzInterval								
44	S	Coat AW c1	Coat AW c2	Number	89	89	89	89	89	89	89	89
44	S	=44	=S	Mean	66.3	22.9	16.1	42.4	42.6	23.3	36.1	36.0
44	S			Min	63.5	18.2	14.9	37.1	37.1	21.2	32.6	31.0
44	S			Max	69.4	24.6	18.1	47.4	48.2	24.9	39.2	42.4
44	S			StdDev	1.2	0.9	0.6	1.6	1.7	0.7	1.4	1.6
44	S			ConfidenzInterval	0.3	0.2	0.1	0.3	0.3	0.1	0.3	0.3
44	R	Coat AW c1	Coat AW c2	Number	264	264	264	264	264	264	264	264
44	R	=44	=R	Mean	68.1	23.1	16.0	42.3	42.7	24.6	35.8	35.9
44	R			Min	62.7	16.8	14.6	36.7	37.8	21.6	30.0	29.9
44	R			Max	73.2	24.4	18.0	47.3	47.4	26.9	40.4	40.5
44	R			StdDev	1.1	0.8	0.7	1.7	1.5	0.7	1.8	1.7
44	R			ConfidenzInterval	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2
44	L	Coat AW c1	Coat AW c2	Number	347	347	347	347	347	347	347	347
44	L	=44	=L	Mean	70.4	23.3	16.0	42.3	42.7	25.5	36.0	36.4
44	L			Min	66.9	17.8	14.3	36.1	36.3	23.3	28.0	30.4
44	L			Max	73.7	25.5	17.9	46.5	46.6	27.9	39.4	41.1
44	L			StdDev	1.1	0.7	0.6	1.7	1.7	0.7	1.7	1.9
44	L			ConfidenzInterval	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2

44	XL	Coat AW c1	Coat AW c2	Number	221	221	221	221	221	221	221	221
44	XL	=44	=XL	Mean	73.4	23.4	15.9	41.7	42.2	26.8	35.2	36.2
44	XL			Min	69.7	21.8	13.8	32.2	33.7	24.7	29.1	29.3
44	XL			Max	77.6	25.3	17.8	46.3	47.0	29.0	40.4	41.3
44	XL			StdDev	1.4	0.6	0.7	2.1	2.1	0.9	2.0	2.1
44	XL			ConfidenzInterval	0.2	0.1	0.1	0.3	0.3	0.1	0.3	0.3
46	S	Coat AW c1	Coat AW c2	Number	24	24	24	24	24	24	24	24
46	S	=46	=S	Mean	66.9	23.1	16.4	44.1	44.4	24.0	37.2	36.8
46	S			Min	64.7	22.4	14.6	41.4	41.5	22.4	32.9	34.3
46	S			Max	69.3	24.2	17.6	47.4	47.8	25.4	40.7	39.8
46	S			StdDev	1.3	0.5	0.7	1.7	1.6	0.7	1.6	1.3
46	S			ConfidenzInterval	0.5	0.2	0.3	0.7	0.6	0.3	0.7	0.5
46	R	Coat AW c1	Coat AW c2	Number	36	36	36	36	36	36	36	36
46	R	=46	=R	Mean	68.7	23.2	16.6	44.8	45.1	24.6	38.2	38.1
46	R			Min	65.9	22.3	14.9	39.3	39.4	23.2	34.0	33.0
46	R			Max	72.9	24.3	18.4	47.9	48.3	27.4	41.5	40.2
46	R			StdDev	1.4	0.5	0.8	1.7	1.7	1.0	1.8	1.7
46	R			ConfidenzInterval	0.5	0.2	0.3	0.6	0.5	0.3	0.6	0.6
46	L	Coat AW c1	Coat AW c2	Number	89	89	89	89	89	89	89	89
46	L	=46	=L	Mean	70.6	23.5	16.7	44.5	44.9	25.5	38.2	38.2
46	L			Min	68.1	22.0	15.1	39.4	40.6	23.7	33.2	32.3
46	L			Max	73.5	25.2	18.5	48.5	49.2	27.8	42.2	41.6
46	L			StdDev	1.0	0.6	0.7	1.8	1.6	0.8	1.7	1.7
46	L			ConfidenzInterval	0.2	0.1	0.2	0.4	0.3	0.2	0.3	0.4
46	XL	Coat AW c1	Coat AW c2	Number	54	54	54	54	54	54	54	54
46	XL	=46	=XL	Mean	74.2	23.5	16.3	43.7	44.3	27.3	37.1	37.9
46	XL			Min	71.2	22.2	14.4	34.1	36.0	25.4	31.8	32.2
46	XL			Max	78.2	24.8	17.6	48.4	49.3	29.9	41.2	41.9
46	XL			StdDev	1.5	0.6	0.7	2.6	2.4	1.1	2.2	2.1
46	XL			ConfidenzInterval	0.4	0.1	0.2	0.7	0.6	0.3	0.6	0.5
48	R	Coat AW c1	Coat AW c2	Number	15	15	15	15	15	15	15	15
48	R	=48	=R	Mean	69.5	23.4	17.4	47.2	47.3	25.0	39.6	39.5
48	R			Min	68.1	18.5	15.8	43.7	43.7	23.7	36.1	35.8
48	R			Max	70.9	25.0	19.5	49.4	49.3	26.2	42.3	42.9
48	R			StdDev	0.9	1.5	0.9	1.4	1.4	0.7	1.9	1.6
48	R			ConfidenzInterval	0.5	0.7	0.5	0.7	0.7	0.3	1.0	0.8
48	L	Coat AW c1	Coat AW c2	Number	15	15	15	15	15	15	15	15
48	L	=48	=L	Mean	70.9	23.9	17.4	45.3	45.8	26.3	39.8	39.8
48	L			Min	68.8	23.1	16.3	42.9	43.6	24.9	36.7	37.4
48	L			Max	74.5	25.1	19.7	48.9	49.1	27.7	42.3	42.6
48	L			StdDev	1.6	0.6	0.8	1.7	1.5	0.8	1.8	1.7
48	L			ConfidenzInterval	0.8	0.3	0.4	0.9	0.8	0.4	0.9	0.8
48	XL	Coat AW c1	Coat AW c2	Number	12	12	12	12	12	12	12	12
48	XL	=48	=XL	Mean	74.7	23.7	16.8	46.9	47.1	27.6	39.8	40.5
48	XL			Min	72.9	22.8	15.7	42.9	43.8	26.4	36.4	38.5
48	XL			Max	78.5	24.3	17.8	50.1	50.2	30.3	41.9	44.4
48	XL			StdDev	1.6	0.4	0.7	2.1	1.8	1.1	1.5	1.8
48	XL			ConfidenzInterval	0.9	0.2	0.4	1.2	1.0	0.6	0.8	1.0

PGC 02120 – Men's Long Sleeve Shirt

STATISTICAL SIZE ANALYSIS

Confidence-Alpha = 5%

ShirtLS C1	ShirtLS C2				Body height (in)	Head circumference (in)	Mid neck girth (in)	Bust/chest girth (in)	Bust/chest girth (horizontal) (in)	Arm length left (in)	Waist girth (in)	Waist band (in)
				Total Cases	8217	8217	8217	8217	8217	8217	8217	8217
		ShirtLS C1	ShirtLS C2	Number	8219	8219	8219	8219	8219	8219	8219	8219
0	0			Mean	68.8	22.7	15.1	38.8	39.2	24.7	32.3	33.0
0	0			Min	58.7	10.5	12.5	30.2	30.2	19.8	25.3	25.5
0	0			Max	79.8	25.5	19.7	51.0	51.6	30.3	44.7	45.3
0	0			StdDev	2.7	0.9	0.8	2.8	2.7	1.3	2.7	2.6
0	0			ConfidenzInterval	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1
n.	a.	ShirtLS C1	ShirtLS C2	Number	239	239	239	239	239	239	239	239
n.	a.	=n.	=a.	Mean	68.3	22.8	15.3	39.3	39.7	24.6	32.8	33.3
n.	a.			Min	59.3	15.0	13.1	32.0	32.0	20.8	26.0	27.9
n.	a.			Max	78.2	24.8	17.7	47.9	47.9	29.2	42.1	41.4
n.	a.			StdDev	2.9	1.0	0.8	2.8	2.7	1.4	2.6	2.4
n.	a.			ConfidenzInterval	0.4	0.1	0.1	0.4	0.3	0.2	0.3	0.3
14	29	ShirtLS C1	ShirtLS C2	Number	3	3	3	3	3	3	3	3
14	29	=14	=29	Mean	64.3	21.5	13.0	34.1	34.8	23.0	27.2	28.1
14	29			Min	60.5	21.3	12.8	33.7	34.0	21.7	25.8	27.9
14	29			Max	68.1	21.7	13.2	34.4	35.3	24.0	28.5	28.4
14	29			StdDev	3.8	0.2	0.2	0.3	0.7	1.2	1.4	0.3
14	29			ConfidenzInterval	4.3	0.2	0.2	0.4	0.8	1.4	1.6	0.3
14	01	ShirtLS C1	ShirtLS C2	Number	14	14	14	14	14	14	14	14
14	01	=14	=01	Mean	63.8	21.4	13.2	33.6	34.0	22.6	27.3	28.0
14	01			Min	62.1	17.6	12.8	31.4	31.4	20.8	25.7	26.8
14	01			Max	66.5	23.0	13.8	37.8	38.1	24.0	30.1	28.9
14	01			StdDev	1.2	1.3	0.4	1.7	1.7	0.8	1.1	0.7
14	01			ConfidenzInterval	0.6	0.7	0.2	0.9	0.9	0.4	0.6	0.3
14	23	ShirtLS C1	ShirtLS C2	Number	9	9	9	9	9	9	9	9
14	23	=14	=23	Mean	66.4	22.0	13.6	34.7	35.4	23.6	28.6	30.2
14	23			Min	64.4	21.0	13.0	31.4	33.2	21.5	25.5	27.9
14	23			Max	70.3	22.6	15.1	38.0	38.5	24.4	30.8	33.2
14	23			StdDev	1.9	0.6	0.6	1.9	1.5	1.0	1.5	1.4
14	23			ConfidenzInterval	1.3	0.4	0.4	1.2	1.0	0.6	1.0	0.9
14	45	ShirtLS C1	ShirtLS C2	Number	5	5	5	5	5	5	5	5
14	45	=14	=45	Mean	69.0	22.5	14.1	37.0	37.3	24.9	30.3	30.9
14	45			Min	67.8	21.3	13.5	35.4	35.5	23.4	28.6	29.0
14	45			Max	71.3	23.3	14.9	38.2	38.7	26.3	32.0	32.8
14	45			StdDev	1.6	0.9	0.6	1.0	1.1	1.0	1.3	1.4
14	45			ConfidenzInterval	1.4	0.8	0.5	0.9	1.0	0.9	1.2	1.3
14	67	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
14	67	=14	=67	Mean								
14	67			Min								
14	67			Max								
14	67			StdDev								
14	67			ConfidenzInterval								
14	38	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
14	38	=14	=38	Mean								
14	38			Min								
14	38			Max								
14	38			StdDev								
14	38			ConfidenzInterval								
14.5	29	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
14.5	29	=14.5	=29	Mean								
14.5	29			Min								
14.5	29			Max								
14.5	29			StdDev								
14.5	29			ConfidenzInterval								

14.5	01	ShirtLS C1	ShirtLS C2	Number	66	66	66	66	66	66	66	66
14.5	01	=14.5	=01	Mean	64.3	21.8	13.8	34.5	34.9	22.6	28.5	29.3
14.5	01			Min	61.5	12.7	12.6	31.5	31.9	20.9	25.8	25.5
14.5	01			Max	66.8	23.4	15.4	38.1	39.2	24.5	31.8	34.3
14.5	01			StdDev	1.4	1.4	0.5	1.5	1.4	0.8	1.3	1.5
14.5	01			ConfidenzInterval	0.3	0.3	0.1	0.4	0.3	0.2	0.3	0.4
14.5	23	ShirtLS C1	ShirtLS C2	Number	146	146	146	146	146	146	146	146
14.5	23	=14.5	=23	Mean	66.6	22.0	13.8	34.6	35.0	23.7	28.6	29.7
14.5	23			Min	60.8	15.4	12.5	30.2	30.2	20.8	25.3	26.1
14.5	23			Max	71.2	24.1	15.6	38.3	39.1	26.0	32.4	35.1
14.5	23			StdDev	1.7	0.8	0.4	1.5	1.5	0.9	1.4	1.5
14.5	23			ConfidenzInterval	0.3	0.1	0.1	0.2	0.2	0.1	0.2	0.2
14.5	45	ShirtLS C1	ShirtLS C2	Number	25	25	25	25	25	25	25	25
14.5	45	=14.5	=45	Mean	69.9	22.2	13.7	34.7	35.3	25.1	28.8	30.7
14.5	45			Min	66.2	21.3	12.9	31.3	31.9	22.8	27.0	28.5
14.5	45			Max	73.5	23.1	14.5	38.0	37.9	26.5	31.7	33.2
14.5	45			StdDev	1.7	0.5	0.4	1.4	1.3	0.8	1.1	1.2
14.5	45			ConfidenzInterval	0.7	0.2	0.2	0.6	0.5	0.3	0.4	0.5
14.5	67	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
14.5	67	=14.5	=67	Mean								
14.5	67			Min								
14.5	67			Max								
14.5	67			StdDev								
14.5	67			ConfidenzInterval								
14.5	38	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
14.5	38	=14.5	=38	Mean								
14.5	38			Min								
14.5	38			Max								
14.5	38			StdDev								
14.5	38			ConfidenzInterval								
15	29	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
15	29	=15	=29	Mean								
15	29			Min								
15	29			Max								
15	29			StdDev								
15	29			ConfidenzInterval								
15	01	ShirtLS C1	ShirtLS C2	Number	183	183	183	183	183	183	183	183
15	01	=15	=01	Mean	64.4	22.2	14.4	36.1	36.5	22.7	29.9	30.2
15	01			Min	59.0	13.0	13.5	30.4	30.4	19.8	26.6	26.6
15	01			Max	70.6	24.0	15.7	40.9	41.8	25.7	33.8	35.1
15	01			StdDev	2.1	1.0	0.5	1.5	1.5	1.0	1.4	1.5
15	01			ConfidenzInterval	0.3	0.2	0.1	0.2	0.2	0.1	0.2	0.2
15	23	ShirtLS C1	ShirtLS C2	Number	851	851	851	851	851	851	851	851
15	23	=15	=23	Mean	66.9	22.3	14.3	36.2	36.6	24.0	29.9	30.7
15	23			Min	61.6	10.5	12.9	32.1	32.5	20.6	26.3	26.7
15	23			Max	72.8	24.0	16.1	41.1	41.1	27.0	36.3	37.7
15	23			StdDev	1.6	1.0	0.4	1.6	1.5	0.9	1.4	1.5
15	23			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1
15	45	ShirtLS C1	ShirtLS C2	Number	327	327	327	327	327	327	327	327
15	45	=15	=45	Mean	70.1	22.4	14.2	36.0	36.5	25.3	29.9	31.4
15	45			Min	64.0	14.4	13.3	32.1	32.4	22.3	26.4	27.5
15	45			Max	76.0	24.5	17.3	45.1	45.8	28.3	40.1	40.8
15	45			StdDev	1.6	0.8	0.4	1.7	1.6	0.9	1.5	1.6
15	45			ConfidenzInterval	0.2	0.1	0.0	0.2	0.2	0.1	0.2	0.2
15	67	ShirtLS C1	ShirtLS C2	Number	19	19	19	19	19	19	19	19
15	67	=15	=67	Mean	72.4	22.8	14.2	36.5	37.2	26.2	30.8	32.7
15	67			Min	65.2	21.5	12.7	31.6	31.9	23.7	28.9	29.9
15	67			Max	76.3	23.8	16.0	41.4	41.6	28.0	36.1	36.8
15	67			StdDev	3.1	0.5	0.7	2.0	2.1	1.3	1.8	1.7
15	67			ConfidenzInterval	1.4	0.2	0.3	0.9	1.0	0.6	0.8	0.8

15	38	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
15	38	=15	=38	Mean								
15	38			Min								
15	38			Max								
15	38			StdDev								
15	38			ConfidenzInterval								
15.5	29	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
15.5	29	=15.5	=29	Mean								
15.5	29			Min								
15.5	29			Max								
15.5	29			StdDev								
15.5	29			ConfidenzInterval								
15.5	01	ShirtLS C1	ShirtLS C2	Number	147	147	147	147	147	147	147	147
15.5	01	=15.5	=01	Mean	64.8	22.5	14.9	37.8	38.1	22.9	31.2	31.4
15.5	01			Min	59.3	19.9	13.7	33.6	34.7	20.2	27.9	26.8
15.5	01			Max	71.9	24.5	16.1	44.1	44.0	25.7	35.8	37.4
15.5	01			StdDev	2.3	0.6	0.5	1.6	1.5	1.0	1.5	1.7
15.5	01			ConfidenzInterval	0.4	0.1	0.1	0.3	0.2	0.2	0.3	0.3
15.5	23	ShirtLS C1	ShirtLS C2	Number	1055	1055	1055	1055	1055	1055	1055	1055
15.5	23	=15.5	=23	Mean	67.3	22.5	14.8	37.6	38.0	24.0	31.3	31.8
15.5	23			Min	58.7	14.3	13.3	31.9	32.6	20.2	27.0	27.7
15.5	23			Max	74.1	24.3	16.5	44.0	44.2	27.8	37.2	40.8
15.5	23			StdDev	1.8	0.9	0.4	1.7	1.6	0.9	1.6	1.7
15.5	23			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1
15.5	45	ShirtLS C1	ShirtLS C2	Number	633	633	633	633	633	633	633	633
15.5	45	=15.5	=45	Mean	70.0	22.5	14.7	37.3	37.9	25.3	30.9	32.1
15.5	45			Min	60.8	12.1	13.5	32.3	32.5	22.2	26.7	27.8
15.5	45			Max	77.6	24.2	16.1	42.3	43.1	29.8	36.9	42.9
15.5	45			StdDev	1.7	1.0	0.4	1.6	1.5	0.9	1.6	1.7
15.5	45			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1
15.5	67	ShirtLS C1	ShirtLS C2	Number	44	44	44	44	44	44	44	44
15.5	67	=15.5	=67	Mean	72.6	22.8	14.5	37.5	38.2	26.7	31.1	32.4
15.5	67			Min	69.1	21.7	13.7	35.1	35.8	24.6	28.3	28.4
15.5	67			Max	76.0	23.6	15.3	40.9	41.2	28.5	34.9	35.6
15.5	67			StdDev	1.5	0.5	0.4	1.4	1.2	0.9	1.3	1.5
15.5	67			ConfidenzInterval	0.4	0.2	0.1	0.4	0.3	0.3	0.4	0.5
15.5	38	ShirtLS C1	ShirtLS C2	Number	5	5	5	5	5	5	5	5
15.5	38	=15.5	=38	Mean	69.3	22.7	14.6	37.1	38.1	25.3	30.2	31.4
15.5	38			Min	67.8	21.8	13.8	36.0	36.7	24.3	28.5	30.5
15.5	38			Max	71.2	23.7	15.0	38.7	40.8	26.6	31.2	32.4
15.5	38			StdDev	1.5	0.7	0.5	1.2	1.7	1.0	1.1	0.8
15.5	38			ConfidenzInterval	1.3	0.6	0.4	1.1	1.5	0.9	0.9	0.7
16	29	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
16	29	=16	=29	Mean								
16	29			Min								
16	29			Max								
16	29			StdDev								
16	29			ConfidenzInterval								
16	01	ShirtLS C1	ShirtLS C2	Number	80	80	80	80	80	80	80	80
16	01	=16	=01	Mean	65.4	22.7	15.4	38.9	39.2	23.0	32.3	32.3
16	01			Min	61.1	18.7	14.1	34.7	34.7	20.4	28.2	26.4
16	01			Max	71.2	24.7	16.7	45.6	46.0	25.7	38.3	39.7
16	01			StdDev	2.3	0.7	0.5	1.7	1.8	1.1	2.0	2.3
16	01			ConfidenzInterval	0.5	0.2	0.1	0.4	0.4	0.2	0.4	0.5
16	23	ShirtLS C1	ShirtLS C2	Number	884	884	884	884	884	884	884	884
16	23	=16	=23	Mean	67.3	22.7	15.3	39.5	39.9	24.0	32.9	33.3
16	23			Min	62.4	13.5	13.6	34.4	35.2	21.4	27.6	27.2
16	23			Max	73.2	24.4	17.4	44.8	44.8	27.0	38.4	42.4
16	23			StdDev	1.6	0.8	0.5	1.7	1.6	0.9	1.7	1.8
16	23			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1
16	45	ShirtLS C1	ShirtLS C2	Number	1329	1329	1329	1329	1329	1329	1329	1329
16	45	=16	=45	Mean	70.2	22.9	15.2	39.1	39.6	25.3	32.6	33.5
16	45			Min	61.2	13.7	13.2	32.1	32.8	21.2	27.2	28.2
16	45			Max	76.6	24.5	16.8	45.4	45.4	28.5	38.7	39.5
16	45			StdDev	1.6	0.8	0.4	1.8	1.7	0.9	1.8	1.9
16	45			ConfidenzInterval	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1

16	67	ShirtLS C1	ShirtLS C2	Number	131	131	131	131	131	131	131	131
16	67	=16	=67	Mean	73.1	23.1	15.0	38.9	39.5	26.9	32.2	33.5
16	67			Min	68.5	13.5	13.7	33.0	34.4	25.1	27.8	29.6
16	67			Max	76.9	24.9	16.4	43.5	43.8	29.2	38.7	40.0
16	67			StdDev	1.5	1.0	0.5	1.9	1.9	0.9	1.9	2.1
16	67			ConfidenzInterval	0.3	0.2	0.1	0.3	0.3	0.1	0.3	0.4
16	38	ShirtLS C1	ShirtLS C2	Number	11	11	11	11	11	11	11	11
16	38	=16	=38	Mean	75.0	22.7	15.2	38.6	39.2	28.1	32.6	33.7
16	38			Min	72.9	21.8	14.7	37.1	38.1	26.4	30.7	29.7
16	38			Max	77.6	23.6	16.2	41.7	41.7	28.9	35.8	36.9
16	38			StdDev	1.7	0.6	0.4	1.2	1.2	0.7	1.6	2.1
16	38			ConfidenzInterval	1.0	0.4	0.3	0.7	0.7	0.4	0.9	1.2
16.5	29	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
16.5	29	=16.5	=29	Mean								
16.5	29			Min								
16.5	29			Max								
16.5	29			StdDev								
16.5	29			ConfidenzInterval								
16.5	01	ShirtLS C1	ShirtLS C2	Number	25	25	25	25	25	25	25	25
16.5	01	=16.5	=01	Mean	67.2	22.9	15.6	39.9	40.4	24.0	33.4	33.5
16.5	01			Min	62.8	21.8	14.4	36.1	36.2	21.1	29.5	28.5
16.5	01			Max	76.6	23.9	16.8	43.2	44.1	27.9	37.4	39.4
16.5	01			StdDev	3.9	0.5	0.6	1.8	1.8	2.0	2.2	2.2
16.5	01			ConfidenzInterval	1.5	0.2	0.2	0.7	0.7	0.8	0.9	0.9
16.5	23	ShirtLS C1	ShirtLS C2	Number	316	316	316	316	316	316	316	316
16.5	23	=16.5	=23	Mean	67.4	22.9	15.8	40.9	41.3	24.1	34.4	34.5
16.5	23			Min	62.7	16.7	14.4	35.3	35.8	20.3	29.7	28.9
16.5	23			Max	75.0	24.6	17.4	47.4	48.2	29.8	39.6	41.1
16.5	23			StdDev	1.9	0.9	0.5	1.9	1.8	1.0	1.9	2.0
16.5	23			ConfidenzInterval	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.2
16.5	45	ShirtLS C1	ShirtLS C2	Number	705	705	705	705	705	705	705	705
16.5	45	=16.5	=45	Mean	70.2	23.0	15.7	40.8	41.2	25.3	34.2	34.8
16.5	45			Min	65.7	13.8	13.9	33.9	34.0	22.8	29.7	28.7
16.5	45			Max	77.3	25.5	17.3	46.6	46.6	28.3	39.5	39.8
16.5	45			StdDev	1.6	0.9	0.5	1.8	1.7	0.9	2.0	2.1
16.5	45			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2
16.5	67	ShirtLS C1	ShirtLS C2	Number	123	123	123	123	123	123	123	123
16.5	67	=16.5	=67	Mean	73.4	23.3	15.5	39.9	40.5	26.9	33.4	34.4
16.5	67			Min	68.5	21.8	14.3	33.7	33.7	24.6	27.5	29.7
16.5	67			Max	77.6	24.5	16.6	44.4	44.9	29.0	38.5	38.3
16.5	67			StdDev	1.6	0.6	0.4	1.8	1.9	1.0	2.0	2.0
16.5	67			ConfidenzInterval	0.3	0.1	0.1	0.3	0.3	0.2	0.3	0.3
16.5	38	ShirtLS C1	ShirtLS C2	Number	13	13	13	13	13	13	13	13
16.5	38	=16.5	=38	Mean	75.2	23.3	15.7	40.5	41.0	27.5	33.6	35.4
16.5	38			Min	72.5	23.0	15.0	36.9	38.7	25.3	31.5	32.6
16.5	38			Max	78.2	24.0	16.8	43.7	44.0	28.9	37.5	39.0
16.5	38			StdDev	1.8	0.3	0.5	2.1	1.7	0.9	1.7	1.8
16.5	38			ConfidenzInterval	1.0	0.2	0.3	1.1	0.9	0.5	0.9	1.0
17	29	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
17	29	=17	=29	Mean								
17	29			Min								
17	29			Max								
17	29			StdDev								
17	29			ConfidenzInterval								
17	01	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
17	01	=17	=01	Mean								
17	01			Min								
17	01			Max								
17	01			StdDev								
17	01			ConfidenzInterval								
17	23	ShirtLS C1	ShirtLS C2	Number	78	78	78	78	78	78	78	78
17	23	=17	=23	Mean	67.3	23.2	16.5	42.4	42.8	24.0	35.7	35.5
17	23			Min	62.8	21.9	15.7	38.6	38.7	21.2	32.2	31.9
17	23			Max	73.2	24.4	18.3	48.0	48.0	27.0	39.9	40.0
17	23			StdDev	2.0	0.5	0.5	1.8	1.7	1.1	1.8	1.8
17	23			ConfidenzInterval	0.4	0.1	0.1	0.4	0.4	0.2	0.4	0.4

17	45	ShirtLS C1	ShirtLS C2	Number	422	422	422	422	422	422	422	422
17	45	=17	=45	Mean	70.2	23.3	16.3	42.6	43.0	25.3	36.2	36.5
17	45			Min	60.2	15.7	14.2	34.1	36.0	20.1	30.5	30.6
17	45			Max	78.5	25.3	18.4	47.8	47.9	30.3	41.0	41.9
17	45			StdDev	1.9	0.7	0.5	2.0	1.9	1.1	1.9	2.0
17	45			ConfidenzInterval	0.2	0.1	0.0	0.2	0.2	0.1	0.2	0.2
17	67	ShirtLS C1	ShirtLS C2	Number	160	160	160	160	160	160	160	160
17	67	=17	=67	Mean	73.2	23.5	16.1	42.5	43.0	26.7	35.9	36.8
17	67			Min	67.2	21.6	14.4	36.5	37.3	23.4	30.3	31.4
17	67			Max	77.9	24.9	17.5	48.4	48.2	29.9	41.6	42.3
17	67			StdDev	1.6	0.5	0.5	2.1	2.0	1.0	2.3	2.0
17	67			ConfidenzInterval	0.3	0.1	0.1	0.3	0.3	0.1	0.4	0.3
17	38	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
17	38	=17	=38	Mean								
17	38			Min								
17	38			Max								
17	38			StdDev								
17	38			ConfidenzInterval								
17.5	29	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
17.5	29	=17.5	=29	Mean								
17.5	29			Min								
17.5	29			Max								
17.5	29			StdDev								
17.5	29			ConfidenzInterval								
17.5	01	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
17.5	01	=17.5	=01	Mean								
17.5	01			Min								
17.5	01			Max								
17.5	01			StdDev								
17.5	01			ConfidenzInterval								
17.5	23	ShirtLS C1	ShirtLS C2	Number	19	19	19	19	19	19	19	19
17.5	23	=17.5	=23	Mean	68.4	23.5	16.9	44.7	44.9	24.5	37.5	36.9
17.5	23			Min	64.0	22.4	15.9	42.4	42.4	22.4	34.8	33.2
17.5	23			Max	76.0	24.6	18.1	47.4	47.8	27.5	40.7	40.1
17.5	23			StdDev	3.6	0.6	0.6	1.7	1.7	1.6	1.6	1.9
17.5	23			ConfidenzInterval	1.6	0.2	0.3	0.8	0.8	0.7	0.7	0.8
17.5	45	ShirtLS C1	ShirtLS C2	Number	104	104	104	104	104	104	104	104
17.5	45	=17.5	=45	Mean	70.6	23.6	17.0	44.1	44.5	25.5	37.6	37.6
17.5	45			Min	66.5	18.5	15.6	39.0	39.6	23.5	31.8	32.3
17.5	45			Max	75.0	25.5	18.4	48.7	49.3	29.6	42.3	42.9
17.5	45			StdDev	1.9	0.8	0.6	2.1	2.0	1.0	2.2	2.1
17.5	45			ConfidenzInterval	0.4	0.2	0.1	0.4	0.4	0.2	0.4	0.4
17.5	67	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
17.5	67	=17.5	=67	Mean								
17.5	67			Min								
17.5	67			Max								
17.5	67			StdDev								
17.5	67			ConfidenzInterval								
17.5	38	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
17.5	38	=17.5	=38	Mean								
17.5	38			Min								
17.5	38			Max								
17.5	38			StdDev								
17.5	38			ConfidenzInterval								
18	29	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
18	29	=18	=29	Mean								
18	29			Min								
18	29			Max								
18	29			StdDev								
18	29			ConfidenzInterval								
18	01	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
18	01	=18	=01	Mean								
18	01			Min								
18	01			Max								
18	01			StdDev								
18	01			ConfidenzInterval								
18	23	ShirtLS C1	ShirtLS C2	Number	3	3	3	3	3	3	3	3
18	23	=18	=23	Mean	70.0	24.2	18.0	46.9	47.0	26.0	39.2	38.8
18	23			Min	69.4	23.9	16.9	44.4	44.3	24.5	37.2	36.1
18	23			Max	71.2	24.7	19.7	48.9	49.1	27.9	41.1	42.6
18	23			StdDev	1.1	0.4	1.5	2.3	2.4	1.8	1.9	3.4
18	23			ConfidenzInterval	1.2	0.5	1.7	2.6	2.8	2.0	2.2	3.8

18	45	ShirtLS C1	ShirtLS C2	Number	19	19	19	19	19	19	19	19
18	45	=18	=45	Mean	70.8	23.7	17.4	45.6	45.8	25.7	39.2	38.7
18	45			Min	66.8	22.9	16.2	40.3	41.4	23.7	34.5	33.9
18	45			Max	75.3	25.1	18.6	49.4	49.3	27.7	42.2	41.8
18	45			StdDev	2.2	0.6	0.6	2.3	2.0	1.2	2.3	2.3
18	45			ConfidenzInterval	1.0	0.3	0.3	1.0	0.9	0.5	1.0	1.0
18	67	ShirtLS C1	ShirtLS C2	Number	9	9	9	9	9	9	9	9
18	67	=18	=67	Mean	71.6	24.0	17.2	46.2	46.5	25.7	38.2	37.8
18	67			Min	69.4	23.2	16.5	44.7	44.6	24.6	33.7	32.7
18	67			Max	74.0	24.8	17.9	47.6	47.7	26.5	39.6	40.5
18	67			StdDev	1.8	0.5	0.4	1.1	1.0	0.6	1.8	2.3
18	67			ConfidenzInterval	1.2	0.4	0.3	0.7	0.7	0.4	1.2	1.5
18	38	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
18	38	=18	=38	Mean								
18	38			Min								
18	38			Max								
18	38			StdDev								
18	38			ConfidenzInterval								
18.5	29	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
18.5	29	=18.5	=29	Mean								
18.5	29			Min								
18.5	29			Max								
18.5	29			StdDev								
18.5	29			ConfidenzInterval								
18.5	01	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
18.5	01	=18.5	=01	Mean								
18.5	01			Min								
18.5	01			Max								
18.5	01			StdDev								
18.5	01			ConfidenzInterval								
18.5	23	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
18.5	23	=18.5	=23	Mean								
18.5	23			Min								
18.5	23			Max								
18.5	23			StdDev								
18.5	23			ConfidenzInterval								
18.5	45	ShirtLS C1	ShirtLS C2	Number	3	3	3	3	3	3	3	3
18.5	45	=18.5	=45	Mean	69.3	24.4	18.6	46.6	47.0	24.9	40.9	39.3
18.5	45			Min	68.8	23.5	17.8	46.1	46.4	24.7	39.8	38.4
18.5	45			Max	69.6	25.0	19.5	47.3	47.3	25.3	41.6	40.6
18.5	45			StdDev	0.4	0.8	0.9	0.6	0.5	0.3	0.9	1.1
18.5	45			ConfidenzInterval	0.5	0.9	1.0	0.7	0.6	0.4	1.1	1.3
18.5	67	ShirtLS C1	ShirtLS C2	Number	5	5	5	5	5	5	5	5
18.5	67	=18.5	=67	Mean	73.1	23.3	16.8	46.0	46.4	26.8	38.2	39.7
18.5	67			Min	72.5	22.4	16.2	43.0	42.9	25.8	36.5	37.7
18.5	67			Max	74.1	24.2	17.6	50.1	50.2	27.8	40.4	42.6
18.5	67			StdDev	0.7	0.8	0.7	2.7	2.6	0.8	1.6	2.1
18.5	67			ConfidenzInterval	0.6	0.7	0.6	2.4	2.3	0.7	1.4	1.8
18.5	38	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
18.5	38	=18.5	=38	Mean								
18.5	38			Min								
18.5	38			Max								
18.5	38			StdDev								
18.5	38			ConfidenzInterval								
19	29	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
19	29	=19	=29	Mean								
19	29			Min								
19	29			Max								
19	29			StdDev								
19	29			ConfidenzInterval								
19	01	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
19	01	=19	=01	Mean								
19	01			Min								
19	01			Max								
19	01			StdDev								
19	01			ConfidenzInterval								

19	23	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
19	23	=19	=23	Mean								
19	23			Min								
19	23			Max								
19	23			StdDev								
19	23			ConfidenzInterval								
19	45	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
19	45	=19	=45	Mean								
19	45			Min								
19	45			Max								
19	45			StdDev								
19	45			ConfidenzInterval								
19	67	ShirtLS C1	ShirtLS C2	Number	7	7	7	7	7	7	7	7
19	67	=19	=67	Mean	73.5	24.0	17.2	46.3	46.8	27.1	40.4	41.3
19	67			Min	70.4	23.6	15.8	42.4	43.1	25.1	36.3	37.5
19	67			Max	79.8	24.5	19.1	51.0	51.6	28.8	44.7	45.3
19	67			StdDev	3.1	0.3	1.1	3.6	3.5	1.3	3.4	3.5
19	67			ConfidenzInterval	2.3	0.2	0.8	2.7	2.6	1.0	2.5	2.6
19	38	ShirtLS C1	ShirtLS C2	Number	0	0	0	0	0	0	0	0
19	38	=19	=38	Mean								
19	38			Min								
19	38			Max								
19	38			StdDev								
19	38			ConfidenzInterval								

PGC 01672 – Men's Short Sleeve Shirt

STATISTICAL SIZE ANALYSIS

Confidence-Alpha = 5%

ShirtSS C1					Body height (in)	Head circumference (in)	Mid neck girth (in)	Bust/chest girth (in)	Bust/chest girth (horizontal) (in)
				Total Cases	8219	8219	8219	8219	8219
		ShirtSS C1	0	Number	8219	8219	8219	8219	8219
0	0			Mean	68.8	22.7	15.1	38.8	39.2
0	0			Min	58.7	10.5	12.5	30.2	30.2
0	0			Max	79.8	25.5	19.7	51.0	51.6
0	0			StdDev	2.7	0.9	0.8	2.8	2.7
0	0			ConfidenzInterval	0.1	0.0	0.0	0.1	0.1
n.a.		ShirtSS C1	0	Number	237	237	237	237	237
n.a.	0	=n.a.		Mean	68.4	22.8	15.3	39.3	39.7
n.a.	0			Min	59.3	15.0	13.1	32.0	32.0
n.a.	0			Max	78.2	24.8	17.7	47.9	47.9
n.a.	0			StdDev	2.9	1.0	0.8	2.8	2.7
n.a.	0			ConfidenzInterval	0.4	0.1	0.1	0.4	0.3
14		ShirtSS C1	0	Number	29	29	29	29	29
14	0	=14		Mean	66.0	21.9	13.5	34.4	34.8
14	0			Min	61.8	19.5	12.6	31.4	31.4
14	0			Max	74.8	24.1	15.6	37.7	38.2
14	0			StdDev	2.9	1.0	0.7	1.7	1.8
14	0			ConfidenzInterval	1.1	0.4	0.2	0.6	0.6
14 1/2		ShirtSS C1	0	Number	229	229	229	229	229
14.5	0	=14.5		Mean	66.5	22.0	13.8	34.9	35.4
14.5	0			Min	60.5	12.7	12.5	30.4	30.4
14.5	0			Max	76.3	23.7	15.0	39.2	39.4
14.5	0			StdDev	2.4	1.1	0.4	1.6	1.5
14.5	0			ConfidenzInterval	0.3	0.1	0.1	0.2	0.2
15		ShirtSS C1	0	Number	1287	1287	1287	1287	1287
15	0	=15		Mean	67.4	22.3	14.3	36.3	36.8
15	0			Min	58.7	10.7	12.9	30.2	30.2
15	0			Max	76.3	24.5	17.3	45.1	45.8
15	0			StdDev	2.5	0.9	0.5	1.8	1.7
15	0			ConfidenzInterval	0.1	0.1	0.0	0.1	0.1
15 1/2		ShirtSS C1	0	Number	2281	2281	2281	2281	2281
15.5	0	=15.5		Mean	68.3	22.5	14.8	37.7	38.2
15.5	0			Min	59.0	10.5	13.3	31.9	32.5
15.5	0			Max	77.6	24.4	17.4	48.0	49.2
15.5	0			StdDev	2.5	0.9	0.5	1.9	1.8
15.5	0			ConfidenzInterval	0.1	0.0	0.0	0.1	0.1
16		ShirtSS C1	0	Number	2129	2129	2129	2129	2129
16	0	=16		Mean	69.1	22.8	15.3	39.2	39.7
16	0			Min	60.5	14.6	13.2	32.1	32.8
16	0			Max	77.6	24.7	17.1	47.4	48.2
16	0			StdDev	2.5	0.8	0.5	2.0	1.9
16	0			ConfidenzInterval	0.1	0.0	0.0	0.1	0.1
16 1/2		ShirtSS C1	0	Number	1294	1294	1294	1294	1294
16.5	0	=16.5		Mean	69.9	23.0	15.7	40.6	41.1
16.5	0			Min	62.7	13.7	13.9	33.7	33.7
16.5	0			Max	78.5	25.5	17.7	47.7	47.9
16.5	0			StdDev	2.6	0.9	0.5	2.0	1.9
16.5	0			ConfidenzInterval	0.1	0.0	0.0	0.1	0.1
17		ShirtSS C1	0	Number	514	514	514	514	514
17	0	=17		Mean	70.4	23.3	16.2	42.3	42.7
17	0			Min	62.8	18.2	13.9	34.3	34.3
17	0			Max	77.9	25.3	18.4	48.4	48.2
17	0			StdDev	2.5	0.6	0.6	2.2	2.1
17	0			ConfidenzInterval	0.2	0.1	0.0	0.2	0.2

17 1/2		ShirtSS C1	0	Number	168	168	168	168	168
17.5	0	=17.5		Mean	70.8	23.6	16.8	43.8	44.2
17.5	0			Min	63.1	22.3	15.5	37.4	38.8
17.5	0			Max	76.0	25.5	18.3	48.7	49.3
17.5	0			StdDev	2.6	0.6	0.6	2.1	2.0
17.5	0			ConfidenzInterval	0.4	0.1	0.1	0.3	0.3
18		ShirtSS C1	0	Number	44	44	44	44	44
18	0	=18		Mean	70.4	23.7	17.2	45.3	45.6
18	0			Min	64.7	22.4	15.6	40.3	41.4
18	0			Max	75.3	25.2	18.6	49.4	49.3
18	0			StdDev	2.2	0.7	0.7	2.0	1.9
18	0			ConfidenzInterval	0.6	0.2	0.2	0.6	0.6
18 1/2		ShirtSS C1	0	Number	5	5	5	5	5
18.5	0	=18.5		Mean	73.2	24.0	18.4	48.9	49.3
18.5	0			Min	69.3	23.5	17.4	46.5	47.3
18.5	0			Max	79.8	24.7	19.7	51.0	51.6
18.5	0			StdDev	4.3	0.5	1.1	1.7	1.7
18.5	0			ConfidenzInterval	3.8	0.4	1.0	1.5	1.5
19		ShirtSS C1	0	Number	2	2	2	2	2
19	0	=19		Mean	73.3	24.3	18.4	48.4	48.6
19	0			Min	72.6	24.2	17.6	46.2	46.2
19	0			Max	74.1	24.5	19.1	50.6	51.0
19	0			StdDev					
19	0			ConfidenzInterval					

PGC 00312 – Men's Undershirt

STATISTICAL SIZE ANALYSIS

Confidence-Alpha = 5%

Under-shirt White				Total Cases	Body height (in)	Head circumference (in)	Mid neck girth (in)	Bust/chest girth (in)	Bust/chest girth (horizontal) (in)
		Under-shirt White	0	Number	8219	8219	8219	8219	8219
0	0			Mean	68.8	22.7	15.1	38.8	39.2
0	0			Min	58.7	10.5	12.5	30.2	30.2
0	0			Max	79.8	25.5	19.7	51.0	51.6
0	0			StdDev	2.7	0.9	0.8	2.8	2.7
0	0			ConfidenzInterval	0.1	0.0	0.0	0.1	0.1
n.a.		Under-shirt White	0	Number	237	237	237	237	237
n.a.	0	=n.a.		Mean	68.4	22.8	15.3	39.3	39.7
n.a.	0			Min	59.3	15.0	13.1	32.0	32.0
n.a.	0			Max	78.2	24.8	17.7	47.9	47.9
n.a.	0			StdDev	2.9	1.0	0.8	2.8	2.7
n.a.	0			ConfidenzInterval	0.4	0.1	0.1	0.4	0.3
XXS		Under-shirt White	0	Number	0	0	0	0	0
XXS	0	=XXS		Mean					
XXS	0			Min					
XXS	0			Max					
XXS	0			StdDev					
XXS	0			ConfidenzInterval					
XS		Under-shirt White	0	Number	0	0	0	0	0
XS	0	=XS		Mean					
XS	0			Min					
XS	0			Max					
XS	0			StdDev					
XS	0			ConfidenzInterval					
S		Under-shirt White	0	Number	421	421	421	421	421
S	0	=S		Mean	65.8	22.2	14.3	36.0	36.5
S	0			Min	58.7	14.3	12.5	30.4	30.4
S	0			Max	71.2	24.1	17.3	45.1	45.8
S	0			StdDev	2.0	0.7	0.6	2.0	1.9
S	0			ConfidenzInterval	0.2	0.1	0.1	0.2	0.2
M		Under-shirt White	0	Number	6562	6562	6562	6562	6562
M	0	=M		Mean	68.6	22.7	15.1	38.6	39.1
M	0			Min	59.0	10.5	12.7	30.2	30.2
M	0			Max	77.6	25.5	19.7	49.4	49.3
M	0			StdDev	2.6	1.0	0.8	2.7	2.6
M	0			ConfidenzInterval	0.1	0.0	0.0	0.1	0.1
L		Under-shirt White	0	Number	955	955	955	955	955
L	0	=L		Mean	70.9	23.1	15.6	40.5	41.1
L	0			Min	62.5	15.5	13.5	33.0	33.7
L	0			Max	78.5	25.5	18.2	48.7	49.3
L	0			StdDev	2.2	0.7	0.8	2.6	2.5
L	0			ConfidenzInterval	0.1	0.0	0.0	0.2	0.2
XL		Under-shirt White	0	Number	44	44	44	44	44
XL	0	=XL		Mean	72.6	23.6	16.8	44.9	45.2
XL	0			Min	67.5	22.3	14.6	40.4	40.5
XL	0			Max	79.8	24.8	19.1	51.0	51.6
XL	0			StdDev	2.4	0.6	0.9	2.6	2.5
XL	0			ConfidenzInterval	0.7	0.2	0.3	0.8	0.7
XXL		Under-shirt White	0	Number	0	0	0	0	0
XXL	0	=XXL		Mean					
XXL	0			Min					
XXL	0			Max					
XXL	0			StdDev					
XXL	0			ConfidenzInterval					
XXXL		Under-shirt White	0	Number	0	0	0	0	0
XXXL	0	=XXXL		Mean					
XXXL	0			Min					
XXXL	0			Max					
XXXL	0			StdDev					
XXXL	0			ConfidenzInterval					

PGC 02192 – Men's Caps (Garrison)

STATISTICAL SIZE ANALYSIS

Confidence-Alpha = 5%

Cap					Body height (in)	Head circumference (in)
				Total Cases	8219	8219
		Cap	**0**	**Number**	8219	8219
0	0			**Mean**	**68.8**	**22.7**
0	0			**Min**	**58.7**	**10.5**
0	0			**Max**	**79.8**	**25.5**
0	0			**StdDev**	**2.7**	**0.9**
0	0			**ConfidenzInterval**	**0.1**	**0.0**
n.a.		**Cap**	**0**	**Number**	1120	1120
n.a.	0	=n.a.		**Mean**	**68.8**	**22.8**
n.a.	0			**Min**	**59.0**	**14.6**
n.a.	0			**Max**	**78.2**	**25.0**
n.a.	0			**StdDev**	**2.8**	**0.8**
n.a.	0			**ConfidenzInterval**	**0.2**	**0.0**
6 3/8		**Cap**	**0**	**Number**	31	31
6.375	0	=6.375		**Mean**	**68.3**	**22.3**
6.375	0			**Min**	**64.4**	**20.7**
6.375	0			**Max**	**73.5**	**24.0**
6.375	0			**StdDev**	**2.4**	**0.8**
6.375	0			**ConfidenzInterval**	**0.9**	**0.3**
6 1/2		**Cap**	**0**	**Number**	30	30
6.5	0	=6.5		**Mean**	**67.0**	**21.8**
6.5	0			**Min**	**62.1**	**20.6**
6.5	0			**Max**	**71.9**	**23.5**
6.5	0			**StdDev**	**2.3**	**0.9**
6.5	0			**ConfidenzInterval**	**0.8**	**0.3**
6 5/8		**Cap**	**0**	**Number**	82	82
6.625	0	=6.625		**Mean**	**66.5**	**21.6**
6.625	0			**Min**	**58.7**	**14.3**
6.625	0			**Max**	**74.8**	**23.7**
6.625	0			**StdDev**	**2.9**	**1.1**
6.625	0			**ConfidenzInterval**	**0.6**	**0.2**
6 3/4		**Cap**	**0**	**Number**	372	372
6.75	0	=6.75		**Mean**	**67.0**	**21.7**
6.75	0			**Min**	**59.0**	**13.0**
6.75	0			**Max**	**77.3**	**23.4**
6.75	0			**StdDev**	**2.6**	**0.8**
6.75	0			**ConfidenzInterval**	**0.3**	**0.1**
6 7/8		**Cap**	**0**	**Number**	871	871
6.875	0	=6.875		**Mean**	**67.6**	**22.1**
6.875	0			**Min**	**59.3**	**10.5**
6.875	0			**Max**	**76.0**	**24.7**
6.875	0			**StdDev**	**2.5**	**0.8**
6.875	0			**ConfidenzInterval**	**0.2**	**0.1**
7		**Cap**	**0**	**Number**	1610	1610
7	0	=7		**Mean**	**68.3**	**22.4**
7	0			**Min**	**60.0**	**12.1**
7	0			**Max**	**76.0**	**24.8**
7	0			**StdDev**	**2.5**	**0.7**
7	0			**ConfidenzInterval**	**0.1**	**0.0**
7 1/8		**Cap**	**0**	**Number**	1403	1403
7.125	0	=7.125		**Mean**	**68.7**	**22.7**
7.125	0			**Min**	**61.1**	**10.7**
7.125	0			**Max**	**76.9**	**24.3**
7.125	0			**StdDev**	**2.6**	**0.9**
7.125	0			**ConfidenzInterval**	**0.1**	**0.0**
7 1/4		**Cap**	**0**	**Number**	1895	1895
7.25	0	=7.25		**Mean**	**69.5**	**23.1**
7.25	0			**Min**	**60.8**	**13.5**
7.25	0			**Max**	**77.9**	**24.5**
7.25	0			**StdDev**	**2.6**	**0.8**
7.25	0			**ConfidenzInterval**	**0.1**	**0.0**

7 3/8		Cap	0	Number	186	186
7.375	0	=7.375		Mean	70.4	23.6
7.375	0			Min	64.0	14.4
7.375	0			Max	78.5	24.7
7.375	0			StdDev	2.6	0.8
7.375	0			ConfidenzInterval	0.4	0.1
7 1/2		Cap	0	Number	543	543
7.5	0	=7.5		Mean	70.3	23.7
7.5	0			Min	63.4	16.7
7.5	0			Max	77.3	24.7
7.5	0			StdDev	2.5	0.7
7.5	0			ConfidenzInterval	0.2	0.1
7 5/8		Cap	0	Number	53	53
7.625	0	=7.625		Mean	71.0	24.2
7.625	0			Min	64.0	22.2
7.625	0			Max	79.8	25.1
7.625	0			StdDev	2.8	0.5
7.625	0			ConfidenzInterval	0.7	0.1
7 3/4		Cap	0	Number	13	13
7.75	0	=7.75		Mean	71.1	24.5
7.75	0			Min	64.4	23.8
7.75	0			Max	77.2	25.2
7.75	0			StdDev	3.8	0.4
7.75	0			ConfidenzInterval	2.1	0.2
7 7/8		Cap	0	Number	8	8
7.875	0	=7.875		Mean	71.2	24.7
7.875	0			Min	68.8	24.4
7.875	0			Max	73.8	25.3
7.875	0			StdDev	1.7	0.3
7.875	0			ConfidenzInterval	1.2	0.2
8		Cap	0	Number	2	2
8	0	=8		Mean	69.4	25.5
8	0			Min	68.8	25.5
8	0			Max	70.1	25.5
8	0			StdDev		
8	0			ConfidenzInterval		
9 7/8		Cap	0	Number	0	0
9.875	0	=9.875		Mean		
9.875	0			Min		
9.875	0			Max		
9.875	0			StdDev		
9.875	0			ConfidenzInterval		

Appendix F – Clothing Issue Phase II

The Clothing Issue Phase II for male recruits at Fort Jackson consists of the following steps:

- Briefing
- Station 16 Changing Room / Manual Measurements
- Station 17 Trousers
- Station 18 Shoes
- Station 19 T-Shirts / Short Sleeve Shirts
- Station 20 Long Sleeve Shirts / Cap Garrison
- Station 21 Coat
- Station 22 All Weather Coat
- Station 23 Gloves / Alterations Trousers
- Modifications for Trousers / Shirts / Coats / AWCoats
- Final Fitting Check

The following tables and pictures describe each issue station with the following information:

- The issued item;
- The main tasks of the fitters;
- The number of personnel;
- What information is given to the personnel;
- What information (item) is issued by the personnel;
- In which span of time the station is passed through;
- The exception cases;
- The exception handling for each case;
- Process examples for 3 recruits (1 of small, 1 of medium and 1 of large size); and,
- Remarks.



Figure 58: Phase II Clothing Issue Manual Measures & Trousers

Issue Station No.:

16 and Changing Room; Manual Measurements

- Fitter instructs a few recruits (i.e. 4) in measuring the other recruits. Two recruits measure while the other two record.
- Measurements are: Head circumference, neck, chest, waist, and arm length measured from the center of the back.
- Recruit is asked for height and weight (no measurements).
- Information is recorded on sheet for recruit to take with him
- Duration example: 1 min

Issue Station No.:

17: Men's Trousers

Work description of the station:

Dress socks and dress trousers (2 for active service, 1 for reserve)

What is done in detail:

Look up height and waist, use guide for first try. Recruit tries on trousers (and changes into T-shirt only) in front of staff. Staff assesses fit and tries on different sizes as needed. Staff then marks alterations of trousers in chalk and writes on a ticket and gives to recruit. Recruit wears trousers to next station.

Look up height and waist. Assess fit of trousers. Mark up alterations as needed. Write issued size on recruit sheet, and records alteration information on ticket as well.

Number of personnel:

1 fitter

Information given to personnel
Height and waist
Information issued (recorded) by personnel:
Alteration information, sizes issued
Time to complete station:
2 hours for 90 recruits
Exception cases:
The staff may be unable to produce good fit.
Exception handling for each case:
Staff then sends recruit to the master fitter around the corner, who recommends the correct alterations***.***
Alterations allowed:
Length, width, outer seams, inner seams, back seams (length is not altered here)
Manual measurements used:
Height, waist
Single recruit sample times: S. 2:00 1 change, M. 1:30, L. 6:20 1 change
Remarks: Sizes range from 26-46 in 1 size increments. S, M, L available in all sizes, XL in most. Pant length is left alone until later. Alterations include taking in/out waist, seat, and outer seam. Sizes tend to be larger than recruit expects due to inflexibility of trousers and higher ride of waist. Often, the same size but different piece is tried twice, due to inconsistencies within sizes. Alterations were marked with chalk, not quantified.

Figure 59: Phase II Clothing Issue Shoes & Short Sleeve Shirts

Issue Station No.: **18: Shoes**
Work description of the station: Dress shoe issue
What is done in detail: Recruit takes seat on raised platform while staff looks up recruit's size and issues shoes. Recruit tries them on and fitter manually checks fit while asking recruit about feel. Staff changes shoes as necessary. Look up recruit shoe size and issue shoes. Check fit and reissue as necessary.
Number of personnel: 1 fitter with 1 recruit helping with stocking
Information given to personnel Shoe size
Information issued (recorded) by personnel: Size issued
Time to complete station: Varies extremely
Exception cases:

Best size unavailable, or nothing fits exactly.
Exception handling for each case: Go with best size. Recruit usually lives with it.
Alterations allowed: None
Manual measurements used: Shoe size
Process: • 9 spots for recruits • Pauses to replenish stock now and again (3 minutes) • Fitter goes up and down line, recruit leaves when properly fitted and another takes his place ***Single recruit sample times***: S. 18:30 2 changes, M. 8:20 1 change, L. 18:30 2 changes
Remarks: Sizes are 5-16 or 17. Ranges in D-EEE width in most, down to C on some.

Issue Station No.: **19 (part a): T-Shirts**
Work description of the station: Issue of belt buckle, tie, and 2 white T-shirts (undershirts)
What is done in detail: Staff looks up chest size, height, and weight and issues size based on that. Recruit tries on T-shirt quickly Look up sizes, issue articles, fill in recruit form.
Number of personnel: 1 fitter (it's usually 1 recruit)
Information given to personnel Chest, height, weight
Information issued (recorded) by personnel: Size issued to them

Time to complete station:
3 hours for 90 recruits.
Exception cases:
Exception handling for each case:
Remarks:
T-shirt sizes range from S, M, L, XL

Issue Station No.:
19 (part b): Short Sleeve Shirt
Work description of the station:
Issue of short sleeve dress shirt (2 for active service, 1 for reserve)
What is done in detail:
Staff looks up neck, height, and weight and issues shirt based on measurements. Recruit tries on article. Staff checks fit, recommends alterations. Staff then records issued size on recruit sheet and alteration information on ticket.
Number of personnel:
1 fitter, 1 recruit issuing belts and ties (this needs to correspond with how you describe part a)
Information given to personnel
Neck, height, weight
Information issued (recorded) by personnel:
Size issued. Alteration information
Time to complete station:
3 hours for 90 recruits
Exception cases:
Size unavailable
Exception handling for each case:

Custom size ordered. No item issued for now. Red zero noted in recruit sheet. (When we asked the fitter, he said he really does issue best size)
Alterations allowed: Button
Manual measurements used: Neck
Process: • Collar button alterations on 1 shirt are used to alter the second without trying the second one on • ***Single recruit sample times***: S. 4:15, M.4:00, L. 18:10 2 changes, alteration on collar button
Remarks: Alterations include moving neck button; shortening of sleeves, bringing in the inseam (side seam) Sizes range from 13-19 in half-size increments. Usually don't wear short sleeve shirt with tie. Recruits are wearing undershirts (T-Shirt).

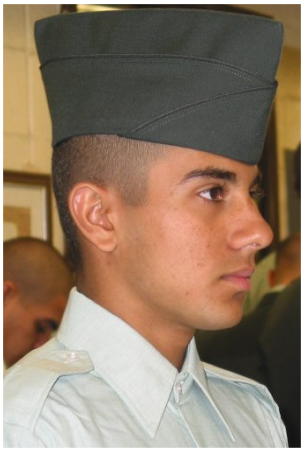




Figure 60: Phase II Clothing Issue Cap Garrison, Coats, Long Sleeves Shirts

Issue Station No.: **20 (part a) : Long Sleeve Shirt**
Work description of the station: Long sleeve dress shirt (1)
What is done in detail: Staff looks up arm length (from C7-the wrist), neck, and chest. Issues

shirt based on that data. Recruit tries on shirt. Staff checks fit, recommends alterations. Staff records issued size and alteration information on ticket. Recruit wears shirt to next station.
Number of personnel: 1 fitter
Information given to personnel Chest, neck, arm length
Information issued (recorded) by personnel: Size issued, alteration information
Time to complete station: 3 hours for 90 recruits.
Exception cases: No sizes available
Exception handling for each case: Custom size is ordered. No item is issued for now. Red zero noted in recruit sheet. I believe they issue best fit for now unless a custom size was pre-ordered.
Alterations allowed: Neck button, arm lengths, and side seams.
Manual measurements used: Neck, chest
Process: • 10 recruits line up at a time, fitter explains procedure • Issues shirts down the line. Recruits remove pins form shirts and put shirt on with only top button done up • Fitter then examines recruit • ***Single recruit sample times***: S. 17:00 1 shirt change, M. 14:00, L. 10:00 referred to fitter
Remarks: Neck sizes range from 15-18.5 in half-sizes Arm length grouped as 30/31, 32/33, 34/35, 36/37, 38 Size 15-16.5 has 30/31-36/37. Size 17-18.5 has 32/33-38

Issue Station No.: **20 (part b): CAP**
Work description of the station: Garrison cap
What is done in detail: Staff looks up size of recruit and issues size then checks for fit. Records size issued on recruit sheet.
Number of personnel: 1
Information given to personnel Head size
Information issued (recorded) by personnel: Size issued
Time to complete station: 3 hours for 90
Exception cases: No size available
Exception handling for each case: Custom order, best fitting cap issued for now
Alterations allowed: None
Manual measurements used: Head girth
Process: Cap is also issued 1 cap change
Remarks: Sizes available range from 6 3/8 to 7 7/8 in 1/8 increments

Figure 61: Phase II Clothing Issue AW Coats & Gloves

Issue Station No.: **21: Coat**
Work description of the station: Dress coat (tunic)
What is done in detail: 2 recruits from unit being outfitted assigned to initial fit post while staff mans final fit post. Recruit reads off height and weight on sheet, and issues appropriate size based on table. Staff checks fit, selects new size if necessary. Also recommends alterations. Staff records size issued and alterations on ticket.
Number of personnel: 2
Information given to personnel None. Height, weight given to ´´first fitter´´
Information issued (recorded) by personnel: Size issued. Alteration information.
Time to complete station: 3-5 hours.

Exception cases:

1. If sizing is too difficult, master fitter is called
2. If no appropriate size found, then a custom order is done and best fit issued in the interim.

Exception handling for each case:

Alterations allowed:

Length, sleeves, side seams, back seams, buttons, neck

Alterations available are: lower collar; move front buttons; take in/out sleeves, back, sides; move back vent; add shoulder pad to level shoulders.

Manual measurements used:

No - Items given by “first fitters”

Process:

- 2 recruits helping fitter at first issue, 2 recruits helping with stocking
- 2 fitters for second issue, 1 for overcoats
- 4 I thought it was 3 at both recruits at a time lined up at first fit, 3 at second fit1 recruit reads sheet while second issues coat
- After first fit, recruit goes to fitter at second fit for assessment, then overcoat issue
- Recruit sample times: First Fit: S. 4:00 1 change, M. 3:00 1 change, L. 2:15
- Recruit sample times: Second fit: S. 5:15 bring in sides of coat, M. 6:30, L. 9:45

Remarks:
Sizes available in photo.

Issue Station No.:

22: All Weather Coat

Work description of the station:

Black Overcoat (All weather coat)

What is done in detail:

Staff looks up size of issued dress coat and issues same size of overcoat. Staff then checks fit, recommends changes as necessary. Records issued size and alterations on ticket

Number of personnel:

1 fitter
Information given to personnel Coat size
Information issued (recorded) by personnel: Size issued, alterations required
Time to complete station: 3-4 hours
Exception cases: No size available. Custom order done, best fit issued in the meantime.
Exception handling for each case:
Alterations allowed: Length, sleeves Alterations include taking in/out sleeves and tail (bottom)
Manual measurements used: No – Items fit with Coat size
Process: Overcoat issue based on issued size of dress coat After issue, coats dumped down chute for alterations if needed ***Single recruit sample times***: Overcoat (including wait after fitting coat) S. 9:30, M. 3:15, L. 2:00
Remarks:

Figure 62: Phase II Clothing Issue Alterations

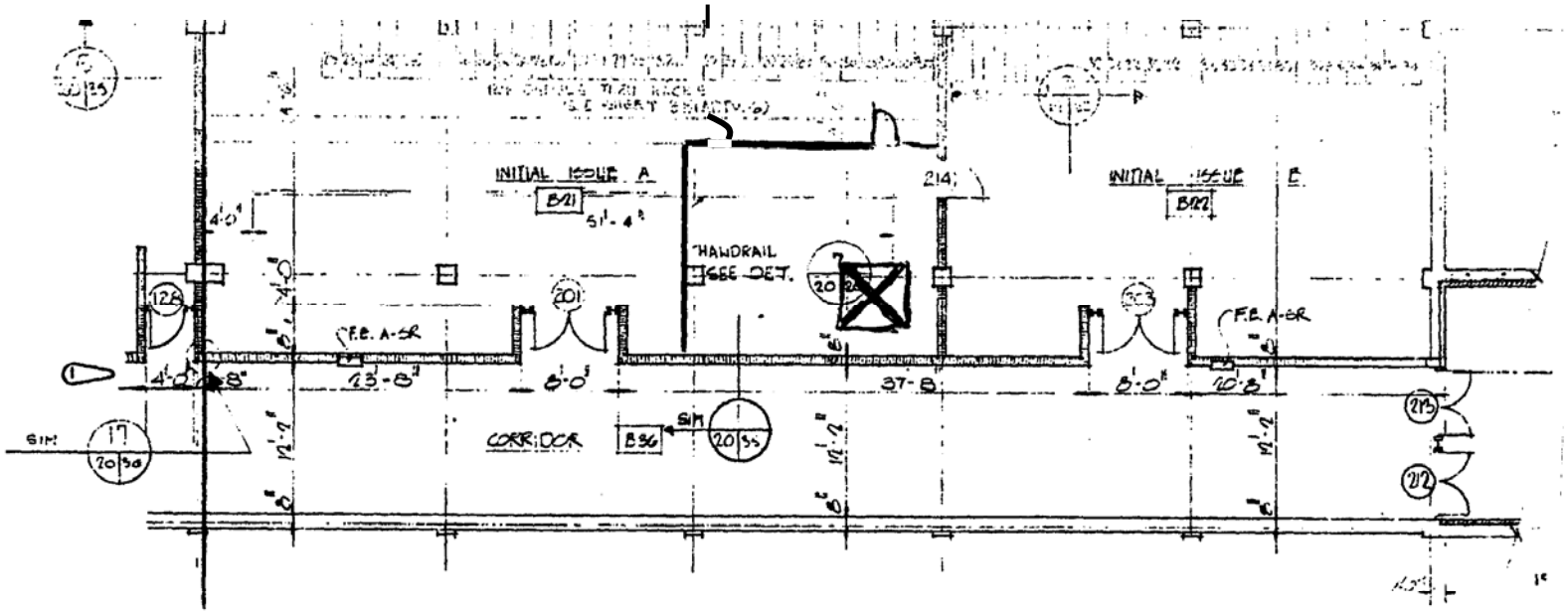
Issue Station No.: **23: Alterations (trousers) and gloves**
Work description of the station: Glove issue, trouser hem measurement
What is done in detail: Staff eyeballs recruit hand size, tries on gloves successively. For trousers, pulls trousers up to proper waist level and measures with calibrated meter stick to generate recommendation for hemming length. Records issued size and hem recommendation on recruit sheet.
Number of personnel: 1-2 fitters
Information given to personnel No quantitative information, only chalk marks.
Information issued (recorded) by personnel: Issued glove size and hem length.
Time to complete station: 3-4 hours.
Exception cases:

Custom glove orders very rare.
Exception handling for each case:
Process: • Recruit puts on trousers for fitter to mark hemming • Trousers dumped down chute for hemming • Gloves are issued after trousers marked • ***Single recruit sample times***: S. 1:00, M. 1:15, L. 2:00 1 change on gloves
Remarks: 10 glove sizes

Figure 63: Phase II Clothing Issue Final Fitting Check

Appendix F – Floor Plan of Installation Site

Building 1895 Washington Rd. Ft. Jackson - Drawing Number JAX 36-00-02 Plate 4-A



PART PLAN – AREA 2

SCALE 1/8" = 1'-0"
FIN FL. EL 234'-0" & 233'-0"

NOTE: FOR OPENINGS IN MASONRY WALLS ABOVE CEILINGS TO ACCOMODATE DUCTWORK ETC., SEE MECHANICAL DUCTWORK FLOOR PLANS.

Appendix G – Scan Posture Poster